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Next Issue: Commodore, Too!

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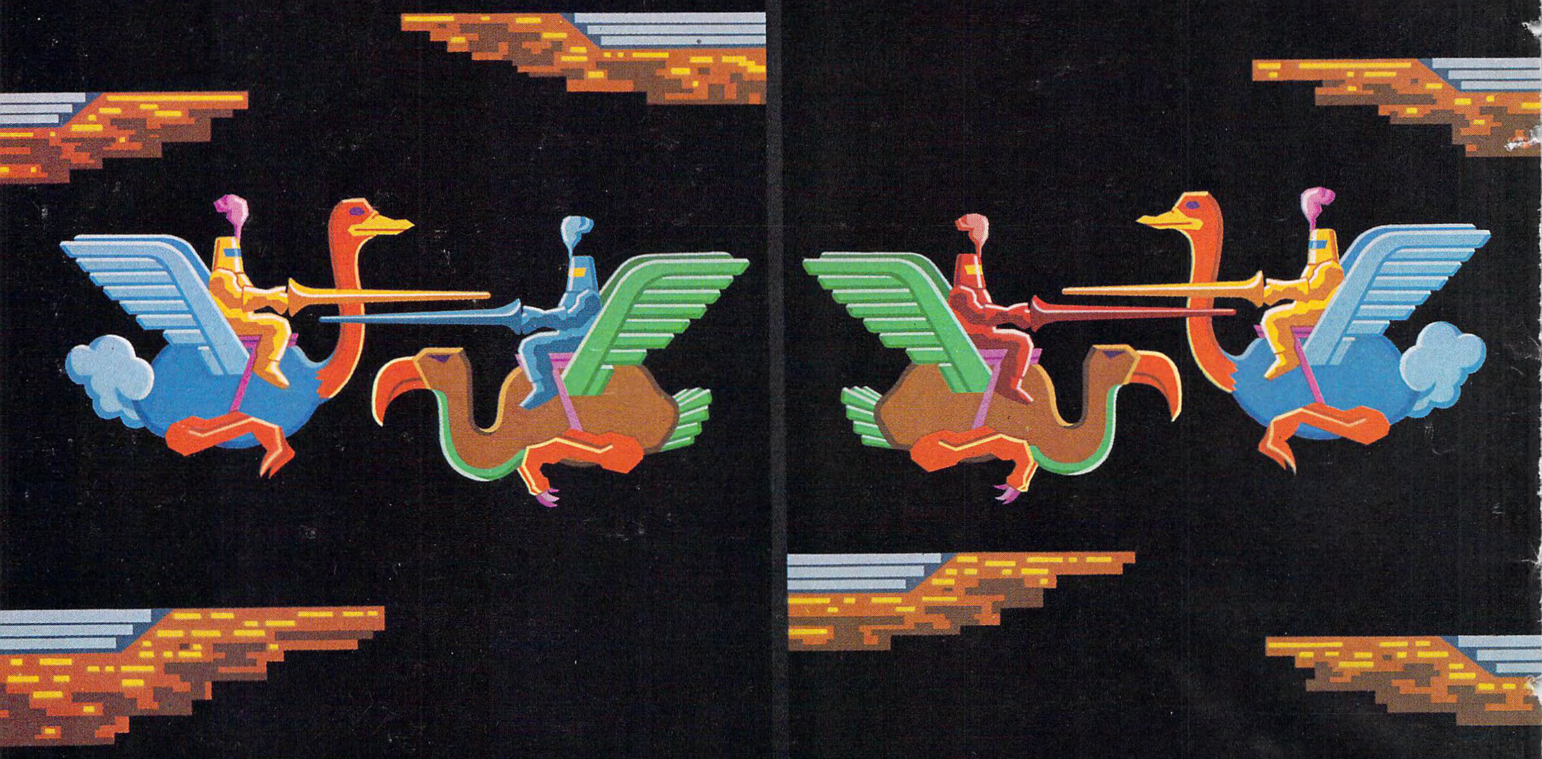

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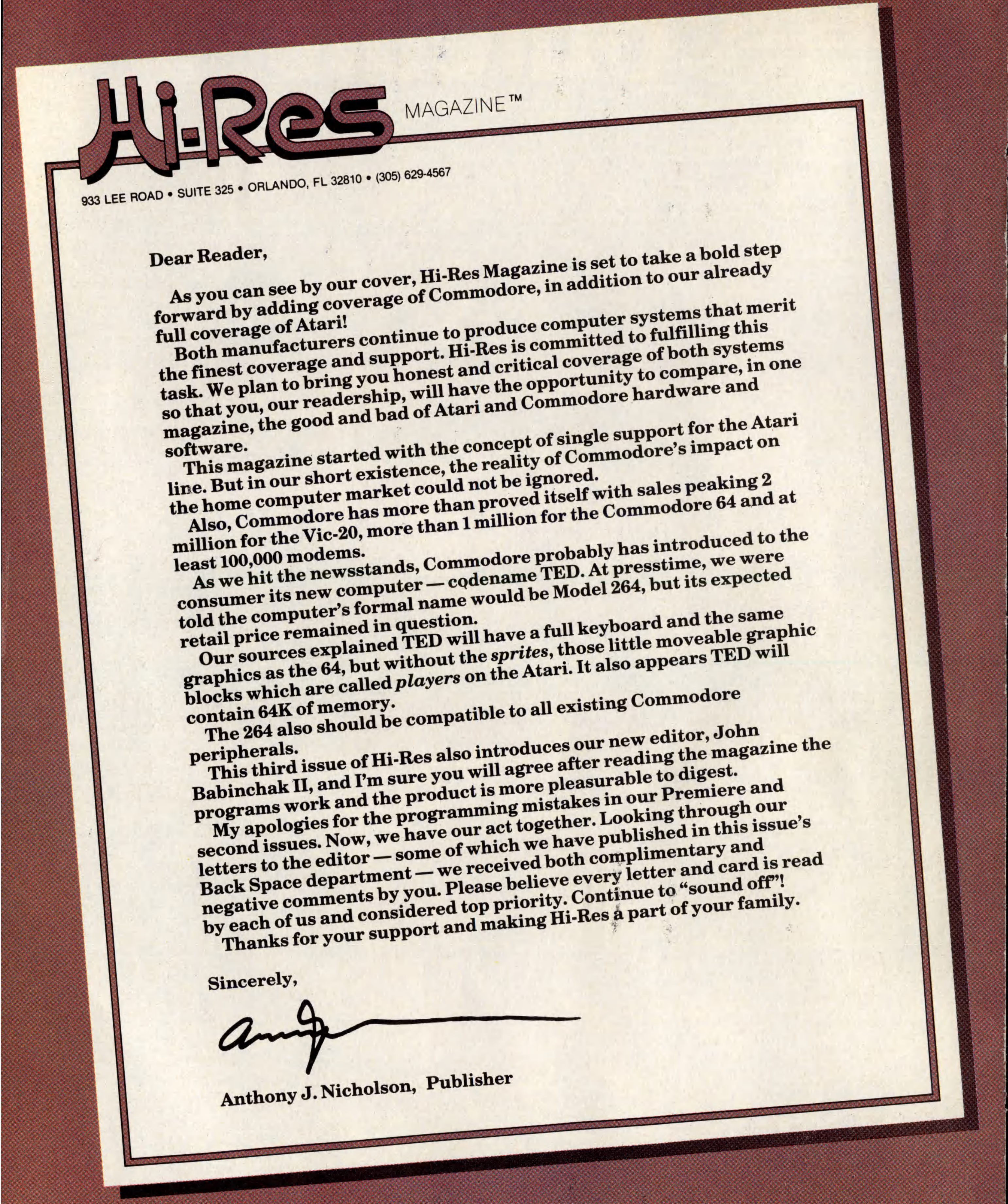


Hi-Res MAGAZINE™
933 LEE ROAD • SUITE 325 • ORLANDO, FL 32810 • (305) 629-4567

Dear Reader,

As you can see by our cover, Hi-Res Magazine is set to take a bold step forward by adding coverage of Commodore, in addition to our already full coverage of Atari!

Both manufacturers continue to produce computer systems that merit the finest coverage and support. Hi-Res is committed to fulfilling this task. We plan to bring you honest and critical coverage of both systems so that you, our readership, will have the opportunity to compare, in one magazine, the good and bad of Atari and Commodore hardware and software.

This magazine started with the concept of single support for the Atari line. But in our short existence, the reality of Commodore's impact on the home computer market could not be ignored.

Also, Commodore has more than proved itself with sales peaking 2 million for the Vic-20, more than 1 million for the Commodore 64 and at least 100,000 modems.

As we hit the newsstands, Commodore probably has introduced to the consumer its new computer — codename TED. At presstime, we were told the computer's formal name would be Model 264, but its expected retail price remained in question.

Our sources explained TED will have a full keyboard and the same graphics as the 64, but without the *sprites*, those little moveable graphic blocks which are called *players* on the Atari. It also appears TED will contain 64K of memory.

The 264 also should be compatible to all existing Commodore peripherals.

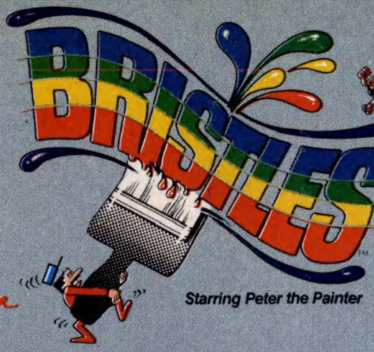
This third issue of Hi-Res also introduces our new editor, John Babinchak II, and I'm sure you will agree after reading the magazine the programs work and the product is more pleasurable to digest.

My apologies for the programming mistakes in our Premiere and second issues. Now, we have our act together. Looking through our letters to the editor — some of which we have published in this issue's Back Space department — we received both complimentary and negative comments by you. Please believe every letter and card is read by each of us and considered top priority. Continue to "sound off"!

Thanks for your support and making Hi-Res a part of your family.

Sincerely,

Anthony J. Nicholson, Publisher



Starring Peter the Painter

designed by Fernando Herrera

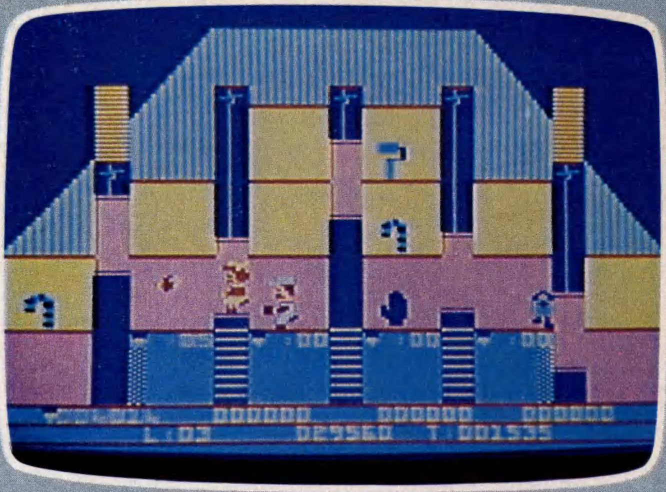
C-64 conversion by Adam Bellin

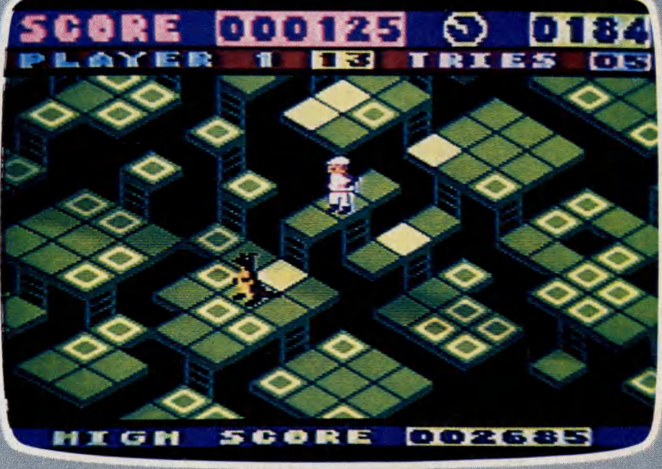
From the creator of ***ASTRO CHASE***™ (Sci-Fi/Fantasy COMPUTER GAME OF THE YEAR, 1984)[1] and My First Alphabet™ (winner of the Atari® Star Award) comes BRISTLES.

☐ Reviews: A+ "The action is fast and frenetic … If you want a game with definite patterns, strategies, great sounds and plenty of action—this is the one."[2] #1 Best Selling computer software in New York.[3]

☐ Features: Real Time Animation™, Sex-Select™, Slow motion, 1 to 4 player option, hidden messages, 8 game screens each with 6 skill levels, hi-res graphics and "invisible paint."

☐ Systems: **COMMODORE 64™** & **ATARI HOME COMPUTERS™**





Actual Game Screens

FLIP
and
FLOP

Starring Flip the Kangaroo
and Mitch the Monkey

designed by James Mangano

C-64 conversion by Paul Kanevsky

This number one Best Seller is Jim's first game for First Star. Here's what the reviewers say about this award winning designer's first computer game.

☐ Reviews: "The audio-visuals are excellent … A definite HOTLINE picked hit."[4] ★★★★ (highest rating) … "quite a different game"[5] "… super graphics, first class sound effects and challenging game play"[6]

☐ Features: 7 different animated intermissions, game screen actually *flips upside down,* 36 levels, 13 different scrolling screens, arcade sounds and music, solo or 2 player option.

☐ Systems: **COMMODORE 64** & **ATARI HOME COMPUTERS**

MORE GOOD NEWS... MORE GAMES! MORE SYSTEMS!

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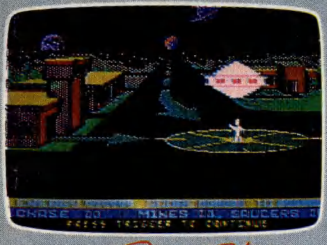
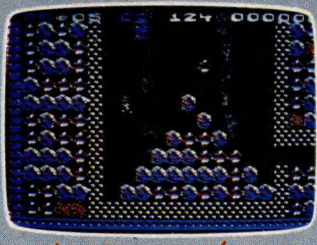


designed by Fernando Herrera

ATARI HOME COMPUTERS
COMMODORE 64
conversion by Mike Crick

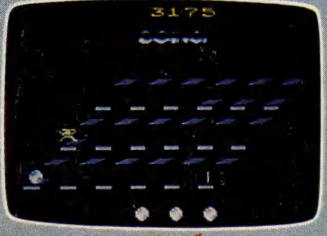
BOULDER DASH™



Peter Liepa and Chris Gray

ATARI HOME COMPUTERS
PC/PC jr.™ conversion by Peter Liepa

BOING!™



designed by Alex Leavens and Shirley A. Russell

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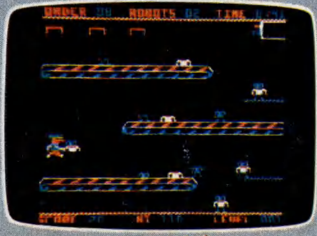

designed by Paul Kanevsky

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[1] Electronic Games Magazine
[2] Computer Games Magazine
[3] East Side Express
[4] Electronic Games Hotline
[5] Video Game Update
[6] Dealerscope Magazine

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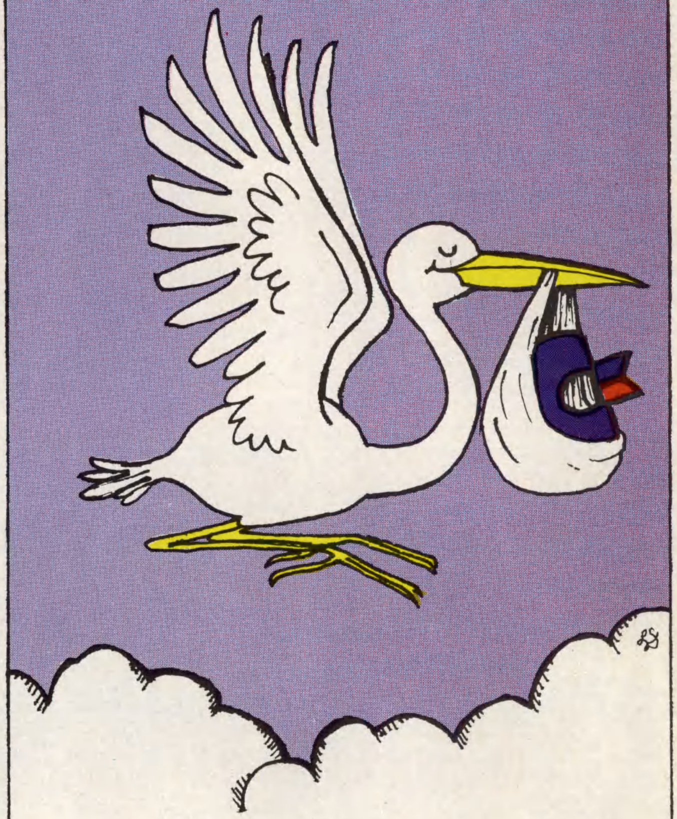
We Proudly Announce A New Arrival...



commodore

Hi-Res introduces complete coverage for the Commodore system — including programs and software and hardware reviews.

NEXT ISSUE

Reviews

Preppie! II

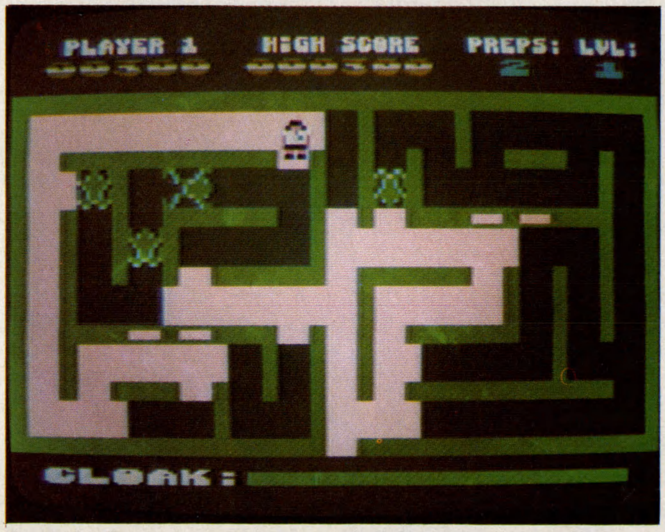
Adventure International
Longwood, FL
16K Cassette
32K Diskette
$34.95

by Steve Harding

"Up and coming prepster Wadsworth Overcash had the world by the tail until a failed Freshman initiation banished him to the tender mercies of the cruel Groundskeeper. Forced to recover wayward golf balls on a course of hellish design, Wadsworth barely escaped with his Lacoste intact. Now, the saga of Wadsworth Overcash continues as he faces his greatest challenge yet in — *Preppie! II!*" So begins the manual in the latest installment in Russ Wetmore's delightful *Preppie!* series from Adventure International.

Preppie! II is far different from *Preppie!*. In *Preppie! II*, our hero finds himself once more in the clutches of the evil Groundskeeper. This time, the golf ball retrieval motif has given way to a paintbrush, and a plethora of "Preppish" colors with which Wadsworth must paint the floor throughout a series of mazes. There are five levels with three different mazes in each level. The object is to paint the entire floor in each of the three mazes.

Sounds easy so far, right? Not so. The first and third maze in each level are inhabited by radioactive frogs that will search out our hero and leap on him, given a chance. Each of these mazes also has a pair of revolving doors that Wadsworth can use and the frogs can't — a real advantage for our hero, unless there happens to be a frog waiting on the other side!



Preppie II

The middle maze in each level should look familiar to *Preppie!* veterans. The lawn mowers and the golf carts are once again out in force in an attempt to "raze" Wadsworth's hopes. These mechanized dangers move horizontally and at varying speeds, making avoiding them all the more difficult.

Wadsworth has one advantage — The Cloak Effect. Pushing the joystick fire-button renders him invisible for a short length of time. The Cloak Effect also makes our hero impervious to radioactive frogs, lawn mowers and golf carts. The amount of Cloak Effect available is shown by a bar at the bottom of the playfield. But use the Cloak Effect sparingly and only when you've painted yourself into a corner. Once the Cloak Effect is gone you're on your own until the next game.

Russ Wetmore has provided a little cartoon respite between the first and second levels: an alligator chasing Wadsworth across the screen. Then Overcash, swinging a hammer, chases the alligator. As for other between-level surprises, you'll have to discover them for yourself. Level three is as far as I can go for now.

Mark Murley's documentation is almost worth the program's suggested retail price of $34.95. It is well written and humorous. You can play the game without reading the manual, but do read it. It's quite good.

In sum, Adventure International and Wetmore are to be commended for a job well done. I can hardly wait for *Preppie! III!*

Chess 7.0

by Larry Atkin
Odesta Corp.
Evanston, IL
48K Disk
$69.95

by Murray D. Kucherawy

"Chess, like a beautiful woman, has the power to make men happy." — *Tarrasch*

For most chess players computerized games are disappointing. The principle reason is that a challenging mental game requires a lot of time.

Most computer chess games reflect that time in their lack of speed. Such lack is understandable since a programmer is faced with nearly unlimited possibilities in the first 10 moves of a chess game.

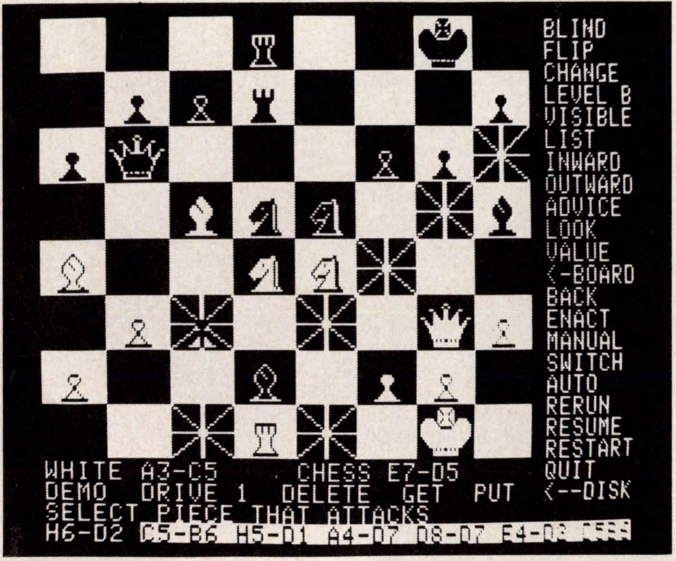
One of the latest efforts is Chess 7.0 from Odesta Corp., which shows improvements in time delays and has other chess "goodies." You can challenge your computer at any one of the 15 skill levels — some of which are "thinking-time limited" levels and others which are "depth-of-search limited."

Chess 7.0 thinks about its next move while you're thinking about yours. If your move was expected by the program, the response is quite fast and, if you're impatient, you can hit return and Chess 7.0 will respond with the best move it has found so far.

The author of Chess 7.0, Larry Atkin, is a member of the programming team that produced the famous and very successful Northwestern University chess programs, which have won several international computer chess championships. They also have placed highly in tournaments where they played against humans.

I have a secret test I apply to chess programs to determine how strong they are. Several years ago I played in a tournament in which I spotted an intriguing possibility involving the sacrifice of my knight. I studied the position intently and finally made the sacrifice. A few moves later I won the game. There was controversy afterward as to whether I really had won or my opponent had simply been unnerved and then had blundered. Nonetheless, I was awarded the "brilliancy" prize for the tournament.

After that, whenever I wanted to test the playing strength of a program, I would — behind closed doors — set up the position, make my sacrifice and see what the computer would do.



```
WHITE A3-C5      CHESS E7-D5
DEMO  DRIVE 1  DELETE  GET  PUT
SELECT PIECE THAT ATTACKS
H6-D2 C5-B6 H5-D1 A4-D7 D8-D7 E4-D3
```

Chess

I applied this test to Chess 7.0. Modesty keeps me from discussing the results, but that Chess 7.0 has my respect.

In this chess-playing game, which will provide years of enjoyment for any chess player, there are several built-in functions that make Chess 7.0 a teacher as well as an opponent.

It plays the opening moves by referring to its internal "library" — a stored collection of moves and responses which have become recognized as strong openings through decades of tournament play. There remains a random element in move selection so each game will be unique.

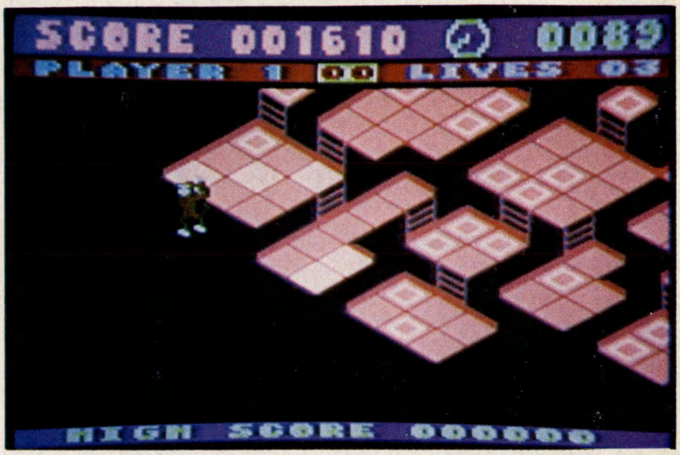
If you're stumped for a move, you can ask for advice and, at most levels, Chess 7.0 will make a suggestion. It also will show you what move it will make if you take its advice. If you ignore its advice and blunder, the program allows you to take back the move (or any number of moves right back to the beginning of the game). You also can peek at what move the program is considering for itself in any position.

Think you're winning? Call up the value function which will display a positive or negative number. Positive means Chess 7.0 has the advantage while negative means you're ahead and the size of the number indicates how strong the advantage is. You may see "MT3", meaning you will be mated in three moves.

Has your wife called you for dinner for the third time? You can save your game to disk. Got a losing position? You can switch sides with the computer. Want to play with a friend? You can use the chessboard on screen and Chess 7.0 will be the referee watching for illegal moves on either side, ready to take over for either player. This feature is also handy for studying the instructive games published in chess columns and magazines.

A very attractive and complete manual is included in this package. Not only is each option explained in detail, but rules, strategy and lore are discussed for the benefit of the novice.

In summary, this is a superlative product surpassing all current chess-playing programs available for microcomputers in speed, playing strength and versatility.



Flip Flop

Flip Flop

by First Star Software
New York, New York
Atari 400/800/1200 Disk
$29.95

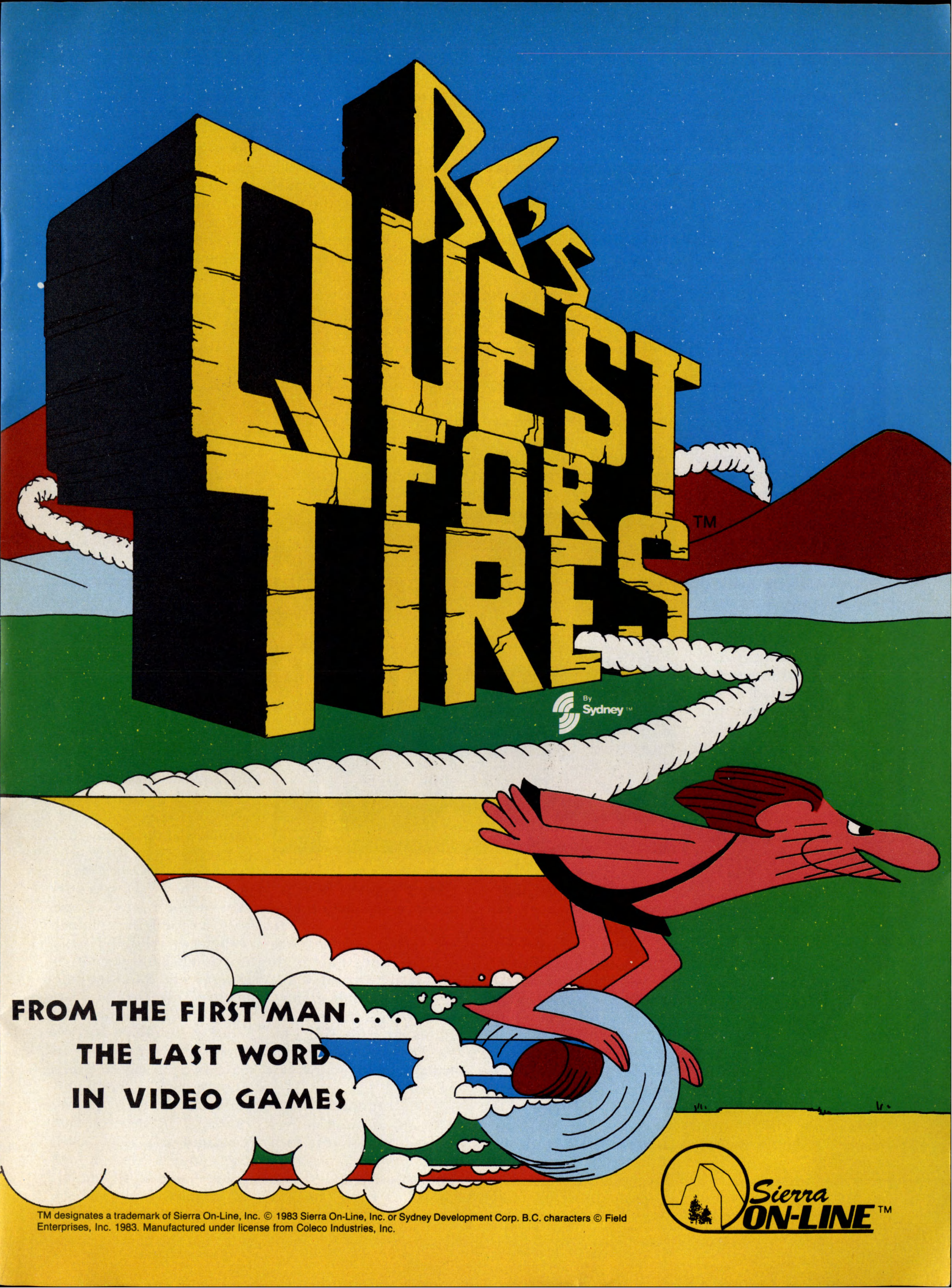
by Mark S. Murley

Game concepts, like hemlines, rise and fall with fadish regularity. Three years ago, horizontal scrolling hit the coin-op market like a right cross from Mr. T. Then, somewhere at a stockholders' meeting, some corporate demagogue must have leaped from his chair and cried: "Hey, there are girls out there with quarters, too! Gimme cute!" Thus, *Pac-Man*, *Centipede*, *Donkey Kong*, and other basically non-violent games were birthed. The cutesy approach to video gaming was in full swing.

Now, the 3-D look is in. If you don't believe that, grab your calculator, saunter down to the corner arcade and start counting the coin-ops that at least go through the motions of a 3-D look and feel. *Zaxxon*, *Sub-Roc 3-D*, *Buck Rogers*, and *Star Wars* are a few that I can think of.

Of course, the promise of true three dimensional graphics on your home computer is sham. What they're doing is shifting the perspective, in much the same manner that you can draw a square from an angle and give the appearance of depth. It's a nice change of pace, though, and there are a few games currently on the market that milk the shifted-perspective cow rather well. Which brings us to *Flip Flop*, from First Star Software.

First impressions stick, and the first impression one gets upon seeing *Flip Flop* is that the guy who designed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it probably spent his summer vacation stuffing quarters into a *Q*Bert* coin-op. But before you sneer, consider the recipe which was prepared so effectively by *Preppie*! author Russ Wetmore: Take the basics to one proven arcade game (*Frogger*), add a liberal reworking of the theme, and garnish generously with originality. Voila! One surefire hit.

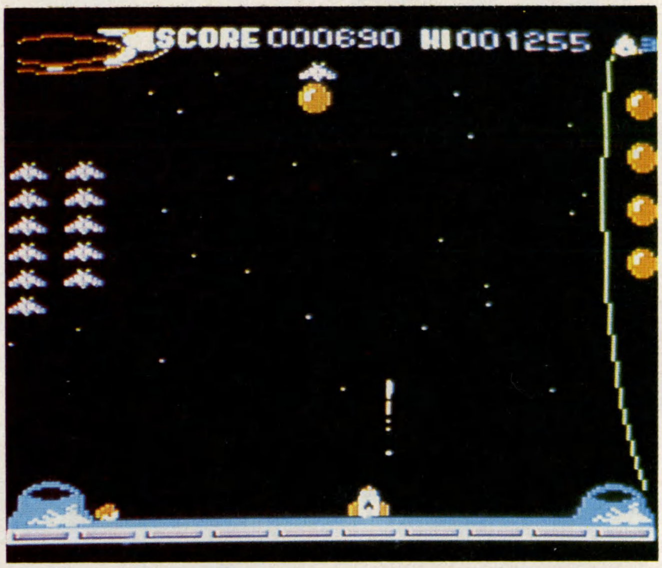
The action in *Flip Flop* takes place on what the game instruction card refers to as the "Zoo of the Future." It's a multi-tiered chessboard of sorts, with the player's perspective being one of looking down slightly at things. Each tier, or platform, may be accessed by small ladders, and contains a number of "good" squares and one or two "magnetic" squares, called sticky squares.

Your link to the game is Flip, a joystick-directed kangaroo who will leap obediently at a touch of the joystick handle. Like *Q*Bert*, the idea is to cover the good ground while avoiding any random dangers that may be out and about. Unlike *Q*Bert*, there are certain squares which should be avoided. Hop on each of the good squares and you'll advance to the next — and more difficult — level. Land on one of the sticky squares and you'll be held in check for several seconds.

The most subtle danger in *Flip Flop* is one of simple slipage: failure to maneuver Flip just so may result in a nasty fall from the relative safety of the playing board into open space. More obvious threats are the Zookeeper and his flying net. This latter menace appears from level three on, and looks something like a screen door run amuck. Despite its simple appearance, the flying net is a merciless little cuss, and it can put a hurtin' on those high-score hopes toot sweet.

You begin each game with an allotment of five critters (called "tries" in the game's instruction card), and earn an extra one with each level completed. Considering the dangers that are prevalent, it may not be too long before you'll be wishing for another 'roo or two. But gee, Dad, why do they call it *Flip Flop*? Well, son, it's like this...

Sometime during the game design process, someone (Steve Martin is a safe bet, although it was probably the program's author) thought it would be a laff riot to turn the entire playing board upside down at certain points in the game, so the player is looking up at, rather than down on, the playing board.



Bandits

Funny thing is, the topsy-turvey schtick *is* a laff riot, but it also adds immeasurably to the game itself.

Of course, no self-respecting kangaroo would be caught dead loitering Down Under such a contraption. Exit kangaroo, enter one honest-to-Bonzo swinging ape, named Mitch. The basic play idea is still in effect — to touch all of the good squares and avoid falling or tangling with one of the deadly screen doors. But this time, you're doing it upside-down, for cripe's sake. The effect is quite marvelous, though somewhat unsettling the first two or three hundred times you experience it. Lest Mitch wear out his welcome, he alternates turns with Flip.

Any game that boasts 36 playing levels needs something to break up the monotony. *Flip Flop* scores admirably on this account by treating the player to some cute between-levels animation. These cartoon intermissions appear after five levels are successfully completed. In the true Lassie-you've-come-home! fashion, Flip and Mitch are shown having accomplished the true goal of *Flip Flop*: a reunion with their friends back at the circus. It's enough to bring tears to your eyes.

There's quite a bit more to *Flip Flop*, including a running clock you have to race against; double maze patterns, the squares of which require a second visit to score; and the strategy side of the game, which includes buying time by "tricking" the Zookeeper or his flying net onto a sticky square.

The standard space shoot-em-ups and generally poor rip-offs are in such overwhelming abundance that I was tempted to give *Flip Flop* a B on this quiz without so much as having seen a single pixel. But after spending several evenings with the game, I'm happy to report that *Flip Flop* has earned a solid A — solely upon its own merits. The game is visually sharp, the sounds and musical accompaniment complement rather than detract from the visuals (are all of you programmers-cum-Mozarts listening out there?), and the upside-down angle offsets any potential playing tedium. *Flip Flop* looks and plays well. And that's good enough for me.

Bandits

Sirius Software
Sacramento, CA
800/1200 Disk
$34.95

by Duane Tutaj

An arcade-type space shoot-em-up game for the Atari, *Bandits* is 100% machine language and the graphics displays are very well done. *Bandits* requires one joystick and is a single player game.

The object of the game is the time-tested arcade theme: shoot down various space ships or bombs while avoiding being hit by return fire. If an enemy ship survives your fire and reaches the right side of the screen, they will take a portion of your supplies and try to escape to their mother ship, which is located in the upper left-hand portion of the screen. Shooting the enemy while they are carrying your supplies will score more points and return your supplies. You have five packages of supplies in each of the 28 different levels. If the enemy manages to steal all five packages at a given level, the game is over. Bonus points, based on the amount of supplies that you have left, are awarded for clear-

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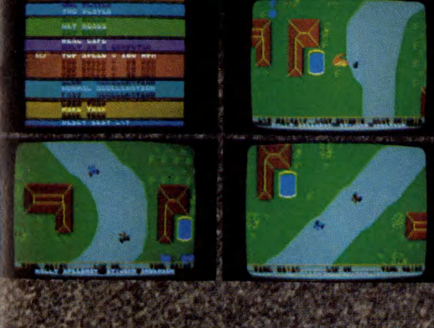

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ing the screen of enemy ships.

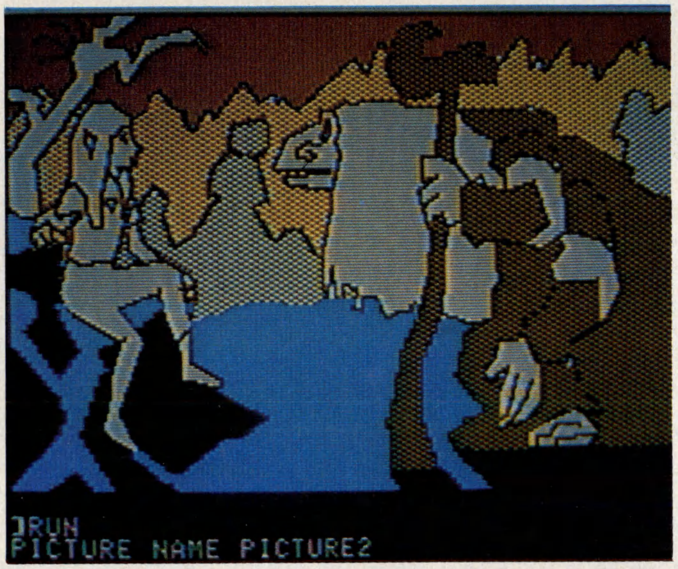
You start the game with five ships of your own and receive an additional ship for every 5,000 points scored. Your greatest defense is an energy shield that is activated by pushing up on the joystick. Repeated pushes will give you the longest shield life. Whenever you lose a ship, your shields can be recharged to their maximum levels. The game can be paused by pushing any key and reactivated with a second key press — an important feature for anyone surviving several levels of play and needing a bit of non-penalized respite. The good news is that the high score is updated after every game. The bad news: the score cannot be saved on your disk.

One of the more positive aspects of *Bandits* is the graphics. They're quite impressive, especially the fast movement of the various enemy ships. The use of different types of supply items adds color to the game and helps one in determining the current level. The sound effects provide a similar function; allowing the player to distinguish between the different types of enemy ships.

To use the familiar "10" scale, I would rate *Bandits* as follows: Concept-7, Graphics-8, Sound-5, Playability-7, Overall-7. All in all, a modest and reasonably enjoyable effort by Sirius.

Sirius will replace a defective disk for only $5.00 with the return on the original. Hopefully, more software houses will start having reasonable replacement policies.

The screen displays a planet surface with a crater on each side. The right-hand side is a portion of a moon that shows your supplies. In the upper left-hand portion of the screen is the bottom of the enemy mother ship through which the enemy attacks and returns with the loot. At the top of the screen is the scoring display which shows your current score, the high score, and the number of remaining ships. While the game is in progress, stars scroll across the screen at varying rates of speed to add to the illusion of movement.



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]RUN
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Dark Crystal

Your ship is located on the planet's surface and moves side to side in true *Space Invaders* fashion, while shooting up at the attackers. At the bottom of the screen is a gauge that monitors the energy left in your shields. Wise players will turn their shields on and off during play to save power for the longest possible protection. Fortunately, competence has its own reward: your depleted energy will recharge slowly while you avoid the enemy attacks.

What makes *Bandits* different from most shoot-em-up-style games are the various combinations of enemy ships that attack. One type of ship is shaped like a rubber ball; it will cascade down on you and continue bouncing up and down off the bottom screen until destroyed. Another unusual ship looks a bit like a centipede and drops napalm bombs. Also, there is the ever-threatening Menace that fades in and out and attacks swiftly.

One important fact about each level is the combination of various enemy ships and the amounts of each ship is different for each level. This means it's possible to be facing elements from several of the most common types of arcade games at one time. This short delay is the one negative part of the whole game. After very fast playing action, it is frustrating to wait up to 20 seconds to see what the next level brings. (Perhaps on the higher levels this wait can be restful and needed to refresh your reflexes, but at the first few levels it really slows down the action.) I feel that a multiple-player option would have been an exciting addition to this game.

B.C.'s Quest for Tires Review

by Reid Nicholson, age 11

B.C.'s Quest for Tires you could say is for the Donkey Kong type of player in the family for in this game you hop on your prehistoric one-wheeler and dodge prehistoric obstacles to save the beautiful girl from the hungry dinosaur.

On the way some of the obstacles you have to dodge are tiny holes and boulders, a fat broad, trees, volcanos and other prehistoric things.

The joystick usage is perfect and the graphics for this game are just as good as the cartoon B.C.

All around you could say that B.C.'s Quest for Tires is the prehistoric home Donkey Kong type of game we've all been waiting for.

The Dark Crystal

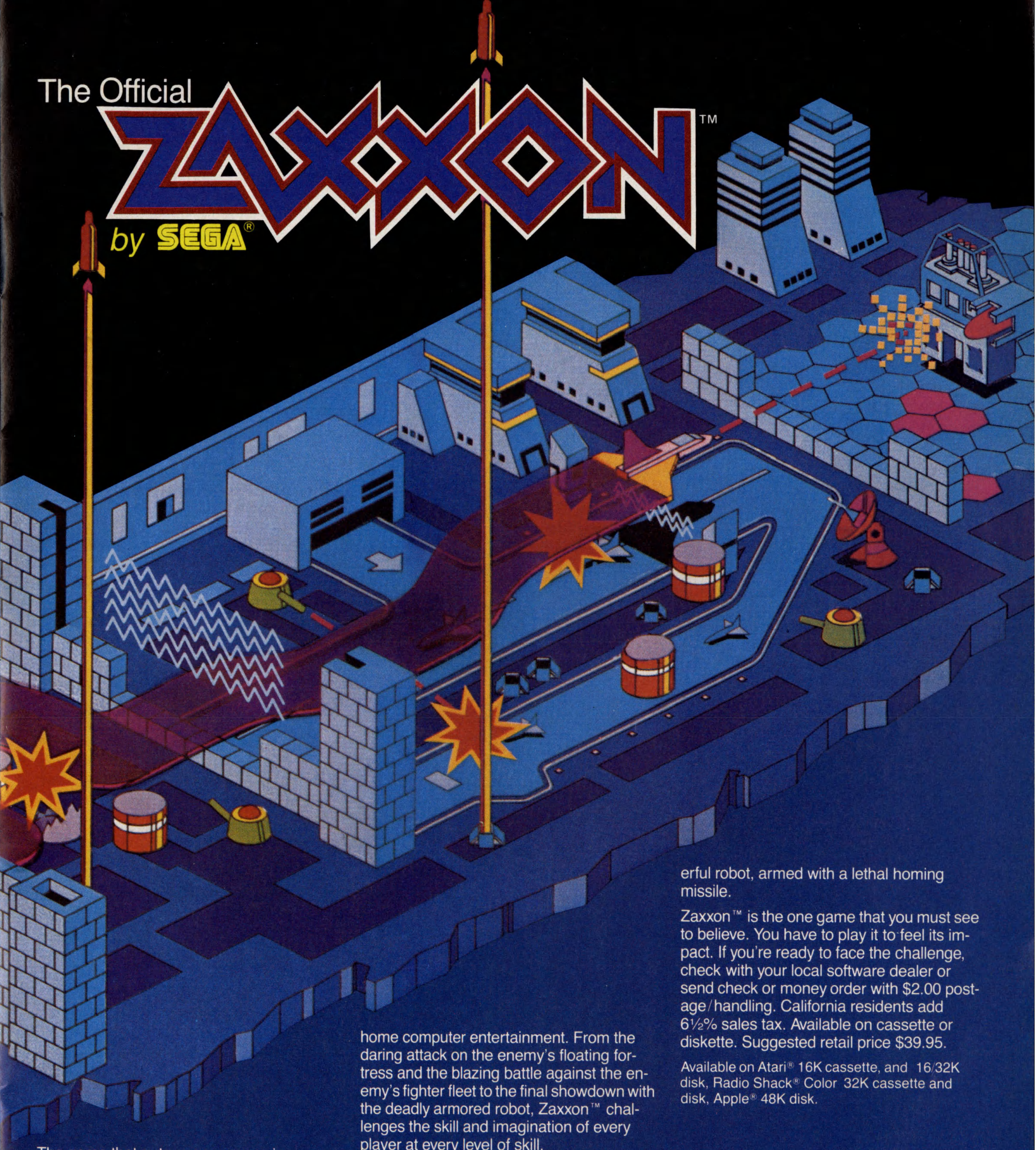
by Sierra On-Line
Coarsegold, CA
Atari 400/800/1200
48K Disk
$37.95

by Mark S. Murley

December 1982 saw the release of one of the most anticipated and esoteric films in recent memory: master puppeteer Jim Henson's epic, "The Dark Crystal." Five years and a reported $26 million in the making, this fantasy adventure tapped the talents of literally hundreds of technical personnel to bring an elaborately constructed universe of characters to life.

Unfortunately, after a brief flare of interest, the audiences stayed away in droves. And the critics, while praising the puppet artistry and attention to minutiae, shook an unforgiving finger at Henson for the film's lack of thematic focus and the inability of the puppets to adequately convey emotion. As reviewer Allen Malmquist wrote in Cinefantastique magazine, "For the love of puppetry, 'The Dark Crystal' succeeds, and for the love of puppetry, 'The Dark Crystal' fails."

But in spite of its flaws,



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"The Dark Crystal" did create a visually exciting and compelling world; a world populated with dozens of strange and wonderful creatures, and more importantly, a world with a Mythos. Watching the film may not have given one the total sense of involvement that Henson and his associates were shooting for, but neither did one leave the theater with feelings of dèjá vu: "The Dark Crystal" was truly a groundbreaking motion picture.

The Next Big Film, as everyone knows, is always dogged by enough tie-ins to fill every Toys'R'Us in New Jersey. "The Dark Crystal" was no exception. Last Christmas saw a full complement of "Dark Crystal" books, posters, toys, stationary, and, if one probably looked long enough, underwear. It is my understanding that Henson himself had some control over what was marketed, which would account for the solid quality of some of the items I've run across. Into this category fall several books that chronicle the film's making from preproduction to the final print. Another is the officially sanctioned Adventure game for the Atari home computer, from the folks at Sierra On-Line.

The *Dark Crystal*, as presented by Sierra, is the latest in their continuing line of Adventure games, and their first motion picture tie-in. *The Dark Crystal*, the game, aspires to the same lofty heights as does the film, and comes not on one, but three double-sided disks. The package itself is a handsome, 8½ by 11 inch, 12-page glossy booklet that features the plot synopsis, map-making and hint sections, and a few empty pages for your notes — all printed on thick, parchment stock. Also included is a full color, 17-by-22 inch poster which depicts Jen at the triumphant climax of the movie.

"The DELETE key! Hit the DELETE key!"

For those of you who haven't seen the film, here's the Reader's Digest condensed version.

Somewhere on the far side of the universe, a spectacle which occurs only once every millenium is about to take place: The Great Conjunction of the planet's three suns. So powerful is this cosmic happening that the urSeks, a gentle race of philosopher beings, have journeyed from their home planet to this world in preparation for the event.

The urSeks proceed to construct a place of worship around the Crystal, which is a large, mystical energy conduit of sorts that can amplify the power of the Great Conjunction to an unlimited degree. The ultimate goal of the urSeks is to use the energy of the Crystal and the Great Conjunction to purge the urSeks' evil sides into nonexistence, leaving only that which is perfect.

At the moment of the Great Conjunction, the urSeks entered the blinding beam of light produced by the Crystal. Each urSek entered as a single being, but exited as two separate races of entities: the hideously replusive Skeksis and the gentle Mystics. Immediately a brawl between the two factions erupted, and the Crystal was damaged, sending a crucial shard flying out somewhere into the surrounding countryside, lost.

The schism complete, the Mystics abandoned the castle to the Skeksis, and fled to the Valley of the Stones. It was in this place that the Mystics regrouped and began working their largely impotent magic against the Skeksis' growing tide of evil.

Eventually, the Skeksis saw fit to exterminate a third race of beings, the Gelflings. But two infant Gelflings, Jen and Kira, survived the slaughter and were raised by the Mystics and the Pod People respectively. And it is Jen and Kira who have the task of restoring the missing shard to the now-darkened Crystal — an act which will end the reign of the Skeksis forever and restore Harmony to all things.

To paraphrase Malmquist's opinion of *The Dark Crystal's* cinematic counterpart, for the love of ambition, *The Dark Crystal* succeeds, and for the love of ambition, *The Dark Crystal* fails. *The Dark Crystal* scores big points in whittling Henson's "The Dark Crystal" down to small-screen, home-computer size, but an Adventure of this size is either going to be very linear (to expedite the storyline and prevent pointless "sightseeing" excursions by the player) or it is going to mire down like a bloated dinosaur in a primordial swamp of endless details, ending up as entertainment only for Mensa Society members.

The Dark Crystal opts for the linear route, leaving one with the impression that each response typed is either right or wrong, with no middle ground. For the novice, this isn't necessarily a bad thing, but anyone who likes their Adventuring on the, uh, adventurous side may find some difficulty with *The Dark Crystal*.

The second major complaint with the game involves the three-disk format. No matter how you slice it, swapping disks in and out of a drive can be a real pain, and *The Dark Crystal* is not equipped to utilize more than a single drive.

If the narrowness of the game and the disk-swapping problem were the only negative aspects of *The Dark Crystal*, then I might be tempted to at least recommend it, however, to novice Adventurers. The graphics themselves are a little lackluster, and the color is not the best. This is distracting in an Adventure of this scope wherein so much of the player's time is spent looking at dozens of screens.

Sierra On-Line, by in large, has an excellent reputation for quality Adventures. Everyone misses the mark now and then, and fans of Sierra On-Line will undoubtedly come out soon with a sparkling new game to add to their otherwise solid line of hits.

The replacement of the shard by Jen is the common aim of both the film and the Adventure game. However, the film only requires approximately 90 minutes of passive participation to see realization of the goal; the Adventure version may require a month or more of active puzzle solving.

The three-disk format of Sierra's *The Dark Crystal* Adventure automatically makes it something of an epic in itself. Side A of the first disk contains the standard loader and title screens, leaving the other five sides of disk space exclusively for data storage and retrieval. Happily, Sierra has eschewed any sort of copy protection for all but Side A. This allows the user to make extra copies of the data disks, which can help take the sting out of the occasional disk accident. And a crashed disk can become a nightmare of epic proportions if you've put a lot of sleepless nights into solving the Adventure.

The opening screen of the Adventure finds Jen resting in a forest; we are informed that he is in the Valley of the Stones, which has become the new dwelling place of the benign Mystics. Upon entry of the player's first command, a Mystic approaches Jen with news most grim: urSu, the leader of the Mystics, is dying and that Jen is requested to quickly go to his side. The Mystic disappears, and the Adventure is begun.

It would be cheating to reveal any details about *The Dark Crystal* beyond this point. Suffice it to say, the Adventure revolves solely around Jen's attempt to locate and restore the shard to its proper place in the Crystal. Along the way, a wide range of strange creatures, places and events will be encountered by Jen and the intrepid Adventurer.

The Dark Crystal religiously follows the typical Adventure format of command entry. You control Jen by inputting commands of one or two words, usually in the verb-noun format. If, for example, one is standing in a forest, one might type GO NORTH to move in a forward direction, or CLIMB TREE if one happens to be standing aside an oak. The true challenge of Adventuring comes from guessing which words work and which don't. Considering the limited vocabulary of most Adventures (usually less than 150 words), this is clearly the most time-consuming aspect of play.

Rally Speedway

by John Anderson
Adventure International
Longwood, FL
Atari 400, 600XL, 800XL, 800, 1200
16K Cartridge
$49.95

by Léo G. Laporte

In the beginning there was the driving game. *Night Driver*. And *Night Driver* begat *Pole Position*. And *Pole Position* begat *Turbo*. And *Turbo* begat *Rally Speedway*. And the smell of gasoline and burning tires filled the sky. And

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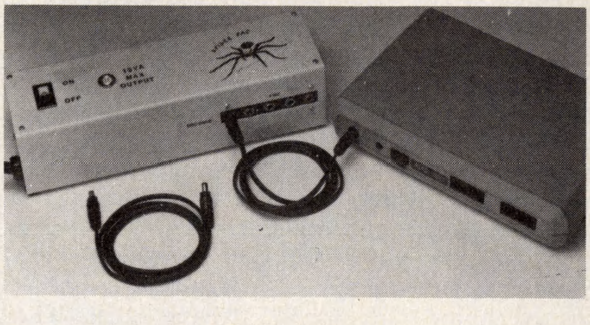

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the sound of screeching brakes rent the air. And the players looked down upon the game and saw that it was good.

Sometimes it seems like the driving game has been with us since the beginning of time. Indeed, it is the oldest type of game still popular at home and in the arcades. There are a number of really good ones available for your home computer, including *Rally Speedway*. Before I discuss the merits of *Rally Speedway*, though, I'd like to make some observations about driving games in general.

Most of us drive out of necessity, whether we like it or not. Usually the mundanities of everyday life don't make particularly good video games. In the case of driving games, though, the computer gives us a chance to drive the way we would like. Who hasn't wanted to sit behind the wheel, throw caution to the wind and floor the accelerator. For those Walter Mittys among us, the driving game makes a thrilling escape.

Because of this, a sense of speed is important to the driving game. The driver must feel he can control his machine, but he also must be tempted to push his control to the limit, risking life and limb while doing so. The elements of speed and imminent danger always must be present.

For the purist, that sense of speed and risk is enough, but the competition between rival game manufacturers is so intense that each is trying to offer something more in his games.

Rally Speedway, written by John Anderson, follows this trend. It is both a driving game and a track building toy, and even though it's only average as the former, it excels at the latter.

My only criticism of *Rally Speedway* is in the way Anderson has designed the driving simulation. Most of the driving games I have played and enjoyed give the player a perspective close to the actual driver's. Usually the player sees the road from behind and slightly above his car. This enhances the illusion of speed and makes the game more difficult because of the player's limited field of view. Unfortunately, *Rally Speedway* is designed so the player looks directly down on the car and road surface, just as you look down on *Pac-Man* as he traverses the maze.

This perspective diminishes the excitement of playing the game. First-person perspective has contributed to the longevity of the driving games as a class. By changing that perspective, Anderson has eliminated the most compelling reason to play the game.

Having made that criticism, let me say everything else about *Rally Speedway* is perfect. This is a beautifully designed game. And, to some extent, the challenge of head to head competition compensates for the lack of excitement.

The race is run on a huge track, about 64 screens big. Two different tracks are included with the cartridge. One or two players race around the course. In the one-player version you'll be racing for time; in the two-player version you'll be racing for blood.

As you race, the track scrolls smoothly beneath you. If your opponent gets so far ahead of you that he leaves the screen, you'll be assessed a time penalty and both drivers will be repositioned next to each other.

If you go off the road and hit a tree or a building, your car will explode into flames. The little driver will leap out, roll over and over to extinguish his burning clothes and then jump up and wave to signal that he is all right. Then it's back on the road.

There are a number of options that can be selected from a menu before the game. You may choose dry, wet or icy roads. The trees and houses can be real or the type you can drive right through. Your top speed and rate of acceleration can be set, too.

A few extra options make *Rally Speedway* different from most racing games. These are the LOAD TRAX, MAKE TRAX, and SAVE TRAX commands. *Rally Speedway* allows you to design your own race track and then save it to disk or cassette. This is the part I found most enjoyable, but then I still like to play with Lincoln Logs.

There are 21 different types of tracks to lay, ranging from straightaways to hairpin turns. There also is an orchard, a lake, three kinds of tree formations and three kinds of houses. You may combine any of these.

The grid is 25 elements square. That's 625 elements to plot, but don't worry, it's not difficult. Everything is done with two joysticks and the function keys. Up to 16 track layouts can be saved on a single disk.

Rally Speedway is graphically gorgeous. The controls are logical and easy to use. The race is challenging, even if it's a bit less than exciting.

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Family Place

by Dorothy Heller

Violence is in the news these days. Recently, millions of Americans tuned in to a television special that portrayed "The Day After," a nuclear attack — the ultimate violence. The plot of another popular film, "War Games," portrays the prospect of nuclear Armageddon as a giant computer game.

Most people don't want real violence in their life, and would be horrified if the zapping, smashing, blasting shoot-'em-up on their computer screen turned from fantasy to reality. Nevertheless, violence seems to be a pervasive theme in lots of computer and arcade games.

"When I take my nephews out for pizza and arcade games, I'm really bothered by the violent content," states one young businesswoman. "I like computer games, but I don't get a charge out of winning by smashing a space ship or blowing up a planet. That kind of reward doesn't feel good to me."

The questions for this month are: how much killing and carnage take place on your home computer screen? How does it affect the way your family uses the computer? And finally, what's the alternative?

Violence, Competition, and Aggression

When Tom Malone began doing research for a doctoral thesis on the qualities that make a successful computer game, he wasn't looking for the results that he found. To his surprise, he discovered that there are differences in what girls and boys like about computer games.

For example, he studied student reactions to an educational game called "Darts." Malone concluded that boys liked the fantasy of making arrows pop balloons. Girls disliked it. He discovered there were other statistical differences in the way girls and boys responded to themes of violence, competition and aggression in computer games.

Of course, human beings aren't statistics. You may be the mother of four and the family Star Commander. But look around you the next time you're in a situation where kids are playing arcade and computer games: How many of the active participants are girls? In your own home, do the female members of your family get as much use and enjoyment from computer games as the males?

"Our concern," says Elizabeth Stage of the Lawrence Hall of Science, "is that many more boys than girls are getting intuitive knowledge and experience through computer games. Women who haven't experienced this crucial first stage of playing with electronic media will lack confidence and hands-on knowledge when it comes to learning programming and other skilled activities."

Remember the scene in "War Games" when the arcade game-playing computer whiz hero told his girlfriend to keep her hands off the keyboard ?

Social Pressure and Social Maturity

"It's reasonable for many girls and women to dislike explosions, bombing, shooting, and killing in computer games," Stage says. "It would be wonderful if more people in general didn't like violence!"

In addition to a dislike for violence, social pressure starts to turn off many girls from computer games — and ultimately, from computer confidence and computer careers.

According to a recent study by Far West Laboratories about computer education in the school, girls show equal interest in computers at the elementary level, but begin dropping out in junior high. "Girls still face discouragement from parents and teachers." Even more powerful is peer pressure.

Girls also tend to mature socially earlier than boys; and girls are encouraged to pay more attention to social relationships. As a result, teen-age boys are "object-oriented." girls are "people-oriented."

Friendly Games for Girls (And Boys)

Does this mean that computer games should be packaged in pink and blue, or that software for women should be limited to cookie recipes?

Definitely not! Fortunately, there are creative and friendly alternatives that make it possible for *everybody* to enjoy computer games.

San Francisco State University's Mathematics Net-

work Curriculum Project, for example, has developed computer activities that appeal equally to girls and boys. Says educator Bill Finzer: "In designing our materials, we minimized aggression and competition" encouraged cooperation, created network situations so kids could communicate with other classrooms via modem, and encouraged the use of computer graphics for artistic purposes."

Finzer found that junior high school-age girls loved networking and communicating with electronic pen pals with the modem. (The secret password for one female computer club was "Boys"!) He also discovered boys also enjoyed the creative and non-violent activities just as much as the girls.

Researchers at Atari's Home Computer Division commented that games stressing cooperation, "creature" games that feature likeable characters rather than space enemies, and word games that have components of humor, surprise, and whimsy are more attractive to female players.

Pacman, of course, is one of the most successful arcade games of all time, and the most violent activity in it is muching! It is also the first arcade game to attract a substantial female following, hence *Ms. Pacman*.

I've also noticed that our blood-thirsty 13-year-old and his computer friends spend hours playing *Miner*, *Frogger*, *Pacman*, *Salmon Run*, *Centipede*, and other computer games that use charm instead of violence. They even sing along to the music in *Miner* (if they think no one is listing!)

The Friendly Alternative

There are many positive steps that parents and educators can take to make sure computers are for everyone, not just for fledging space warriors.

1. Support learning and game software that uses imagination instead of violence. Use the computer for family fun and learning, not just zapping enemy aliens. Enjoy the exciting, mind-bending capabilities of Atari LOGO™, learning games such as Crossword Magic™ and SCRAM™, and encourage your kids to create their own excitement by learning how to program.

See "Equal Games for Girls" and "Evaluating Game and Educational Software" in COMPUTER CONFIDENCE: A Woman's Guide, by Dorothy Heller and June Bower, Acropolis Books Ltd., to learn more about game and learning software and resources.

2. Organize an "Expanding Your Horizons in Science and Math" conference for junior high school-age girls in your school district or community. The Women's Math/Science Network, which has been helping women to organize conferences since 1974, provides a comprehensive handbook and coaching.

One of its recent conferences included panel discussions and Career Exploration Sessions with women who are carpenters, electricians, nuclear physicists, physicians, computer systems analysts, rangers, podiatrists, cabinetmakers, data-processing managers, and elevator mechanics! Write to:

Women's Math/Science Network, Math/Science Resource Center, Mills College, Oakland, CA 415-430-2230.

3. Get involved with computer education in your local school district, as an educator, PTA member, aide, or volunteer.

Find out:

- What computer activities are being offered.
- What percentage of girls participate.
- What programming

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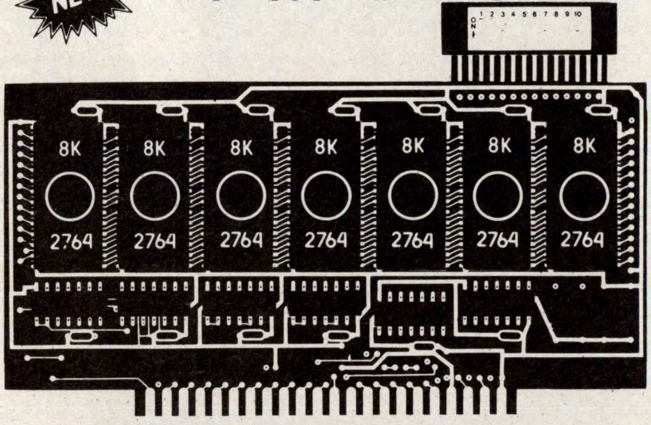

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languages are being taught.

- If math is a prerequisite for taking a computer course.

4. Since many schools require algebra as a prerequisite to learning BASIC, encourage computer education with Atari LOGO and PILOT. LOGO and PILOT are "friendlier" languages that are great for beginners and children as young as elementary school age. Better yet, both languages really encourage young learners to think, solve problems, and use their own creativity.

5. Learn to program your own games! A wonderful new resource that teaches game programming with fun and humor is Dr. C. Wacko's Miracle Guide to Designing and Programming Your Own Atari Arcade Games, (Addison-Wesley). Dr. Wacko and his wife Petunia demonstrate that games can have heroines as well as heroes, and can be about getting to school on time or who put the clam dip in the computer instead of death and destruction.

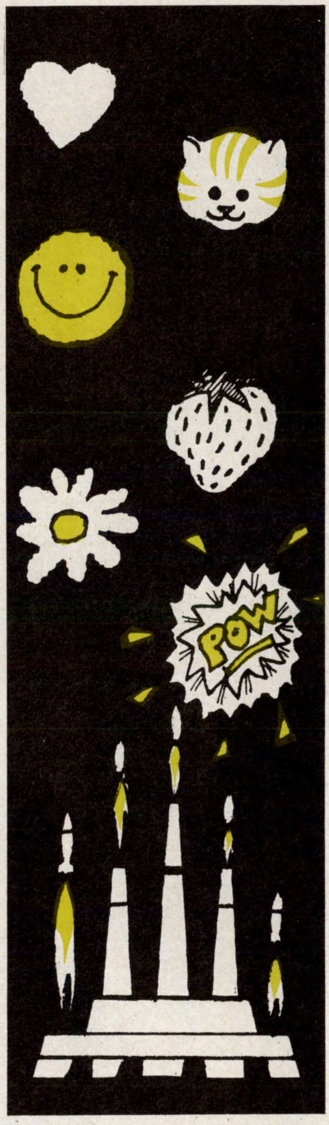
6. Encourage "networking" via modems and the telephone as a home and school computer activity. Using the computer to contact electronic pen pals and exchange information is a "people-oriented" activity that girls enjoy as well as boys. A valuable resource is Free Software for Your Atari Computer, Enrich/Ohaus Publishers, $8.95.

7. Practical applications aren't just for business. Word processing is a fantastic tool that can help you and your children develop creativity and learn self-expression. Encourage your entire family to learn about all computer applications.

Give peace a chance! And give everyone in your family the chance to express their personal creativity with the versatile Atari computer.

More to Come

In future columns, we'll interview an expert on arcade games and women; a women's software group that writes games based on their own experiences as homemakers and working women; and discuss creative programs that enable you to use your computer as an artist's palette.



Dorothy Heller lives in the heart of Silicon Valley, California and writes about people and computers. She is co-author of COMPUTER CONFIDENCE: A Woman's Guide (Acropolis Books) and Free Software for your Atari, (Enrich/Oahus).

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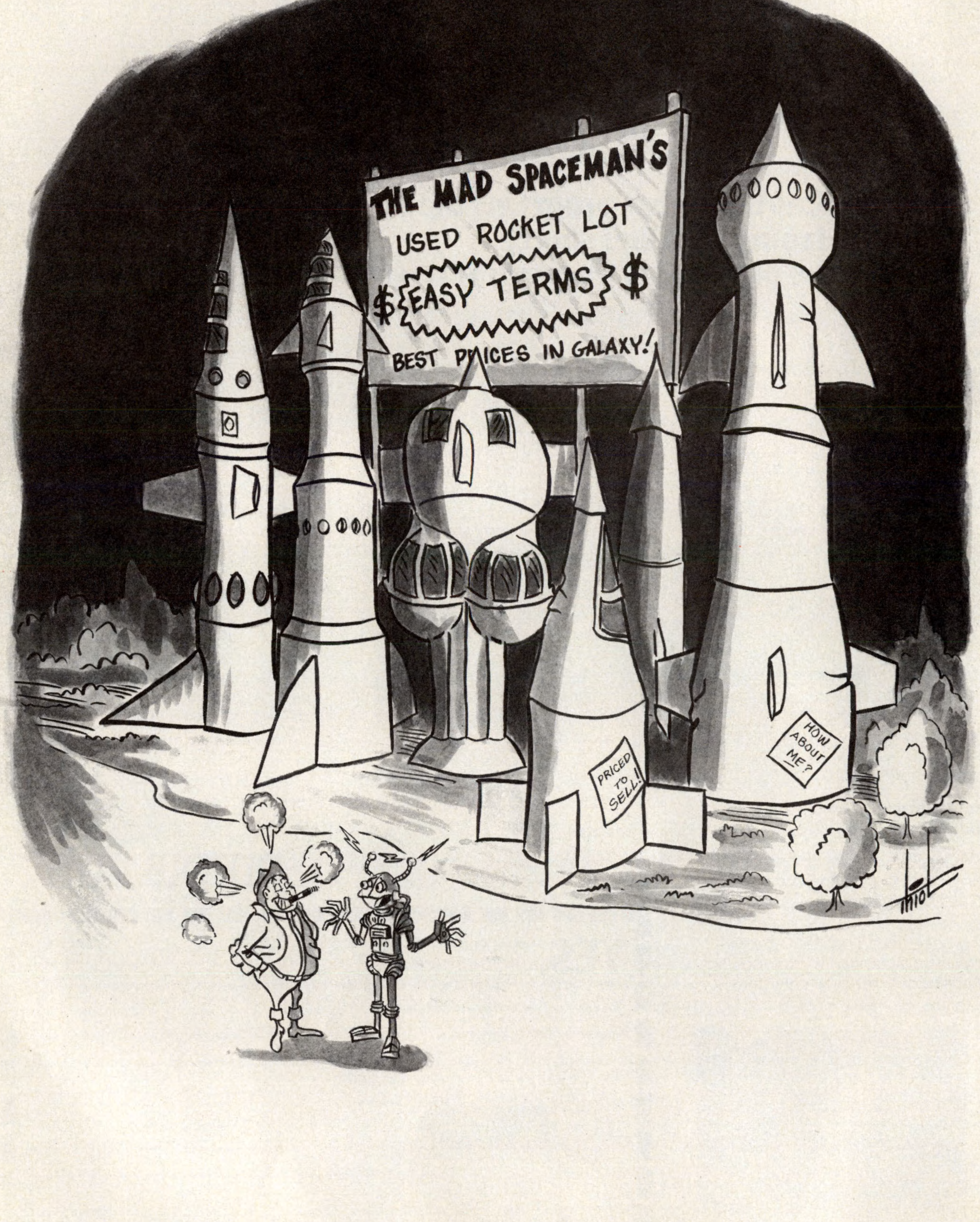
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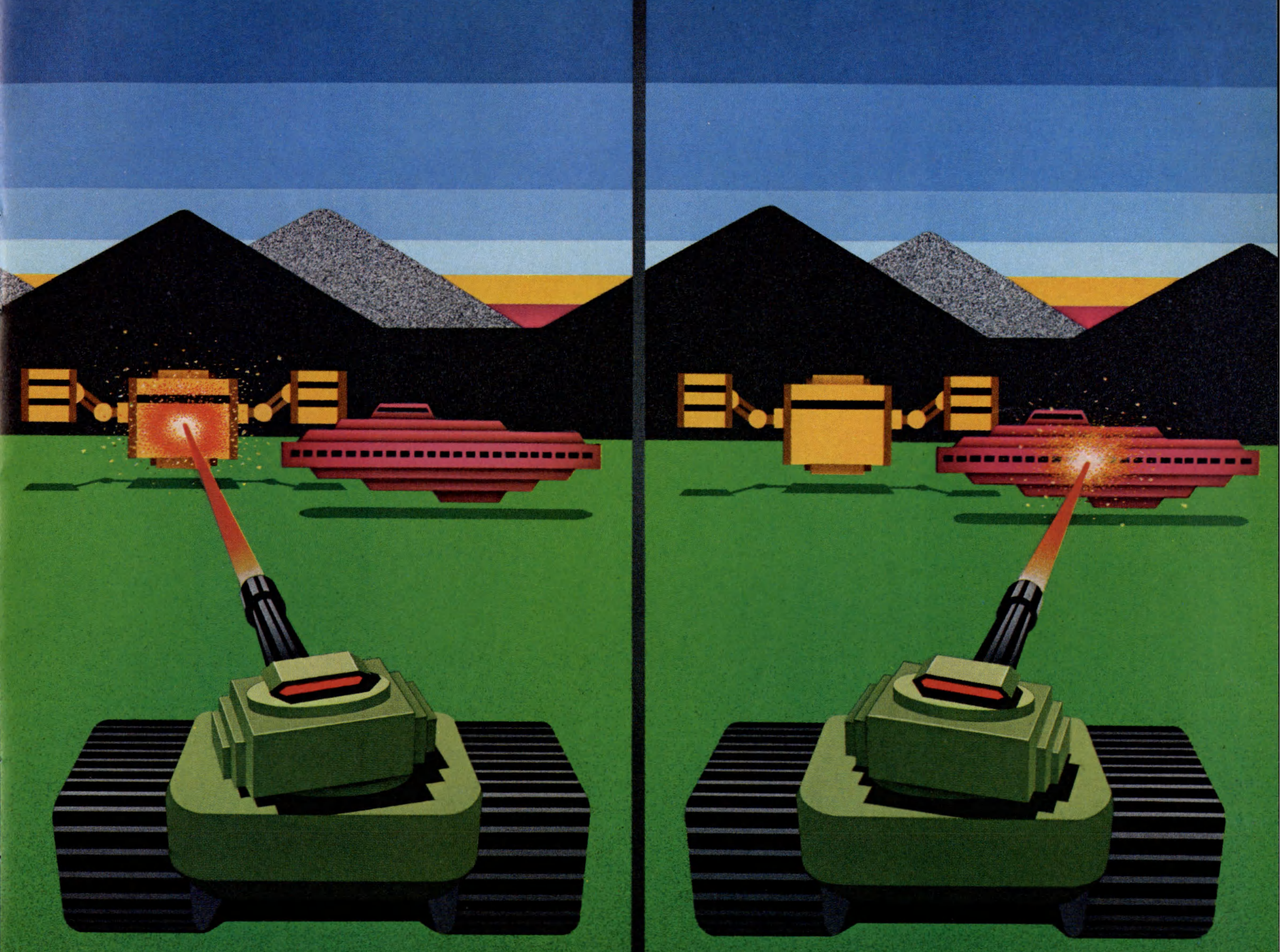

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WISH YOU WERE HERE!

The oft-heralded "computer revolution" has been on the near horizon for as long as most of us can remember. And many people believe that's exactly where it should stay — far, far away so as not to threaten everyday existence and job performance.

Decades of science fiction literature and movies have touted computers as mysterious, powerful machines that only the truly gifted can understand and successfully operate.

In the past few years, as the computer has evolved into the desk-top wonder, many people are panicking. This scary unknown is suddenly a part of their lives. They fear the computer will vividly underscore undesired shortcomings. What if they can't perform on the computer in an age when most occupations are at least indirectly linked to some form of computerization? This fear strikes people where it hurts worst — it's a perceived threat to job security.

Club Mediterranee, the world's largest vacation village organization that has sold package vacations to its members to escape the stresses of civilization for more than 30 years, has identified the computer phobia many people have developed. Club Med reasoned many people could overcome their fears and relax with computers if instruction and practice opportunities were offered in a non-threatening environment without the intrusion of everyday urban life.

In 1983, Club Med and Atari Inc. together introduced a pilot computer program at Club Med-Punta Cana in the Dominican Republic. Atari supplied a number of its home computers, in addition to customized software and trained instructors to ease vacationers into their first computer experience.

True to the Club Med philosophy, however, the computer opportunities are just that — opportunities. Instructions are included in the all-in-one vacation package

by Linda K. Gilliam

price. Club Med vacationers can experiment with the computer or not. There is no pressure to perform, just the opportunity to relax and learn something new.

"Many people are afraid of computers and are afraid of change," said Gerard Barouh, chef de village at Punta Cana. "Our goal is to ease people into learning about computers. We realize it is very difficult to learn something new after working all day long, especially when you have to sacrifice family and leisure time. But on vacation, you have the time. You're relaxed and no one is judging you. It's easier to learn and become enthused about what you have learned when you're relaxed."

Club Med, the first resort organization to offer a sports school, is also a pioneer in providing computer instruction to its members.

Linda Gordon, Atari's vice president of special projects, sees the Club Med computer experience as a milestone in human relations for both companies. "Atari and Club Med are both interested in people and the future. This was a real opportunity to marry both of these common interests. We have learned that in places where people *need* computers the least are probably the best places for them to discover the technology."

It is the enhanced communications aspect which sold Barouh, a native Parisian, on the project. "If people don't learn about computers today, it may be impossible for them to speak to their children tomorrow. We don't want to see these big ruptures in society. If I have a large computer screen on stage and sing a song in French, our American vacationers can follow the words in English," Barouh said.

That's communication. I wouldn't do it all the time because it's friendlier to speak my bad English. With our tennis or sailing computer games, which operate in French, Spanish and English, people of different nationalities can speak and play together. It makes it more interesting."

Club Med-Punta Cana, with its full slate of water sports like swimming, windsurfing, sailing, snorkeling and water skiing, offers an equal number of computer attractions to tempt vacationers. In addition to computer mainstays like BASIC language programming, accounting, word processing and games, Atari has provided customized painting, music, astronomy, astrology and weaving software. As Atari became more attuned with Club Med philosophy, it also developed a tennis tournament organizer, which operates in English, Spanish and French, and a computerized video dictionary to help divers identify the marine life they observe.

In order to get vacationers chummy with computers, Club Med also has relaxed standard classroom barriers. Specially designed computer kiosks are stationed around the village (including the beach) for immediate access to activity information. And if that isn't laid back enough, computer instructions are available on a beachside deck. A total of 83 computers are in use throughout the village.

"The computer program here is only a very important part of our total program," said Barouh. "We want people to realize everything is possible at Club Med. If they want to learn to sail, they can learn to sail. If they want to sleep, they can sleep. Everything is possible. It's like a buffet. You choose what you want. Knowing you can do what you want is very important for a healthy state of mind. The opportunity to choose is Club Med. The computer can help us do all this and enhance communication."

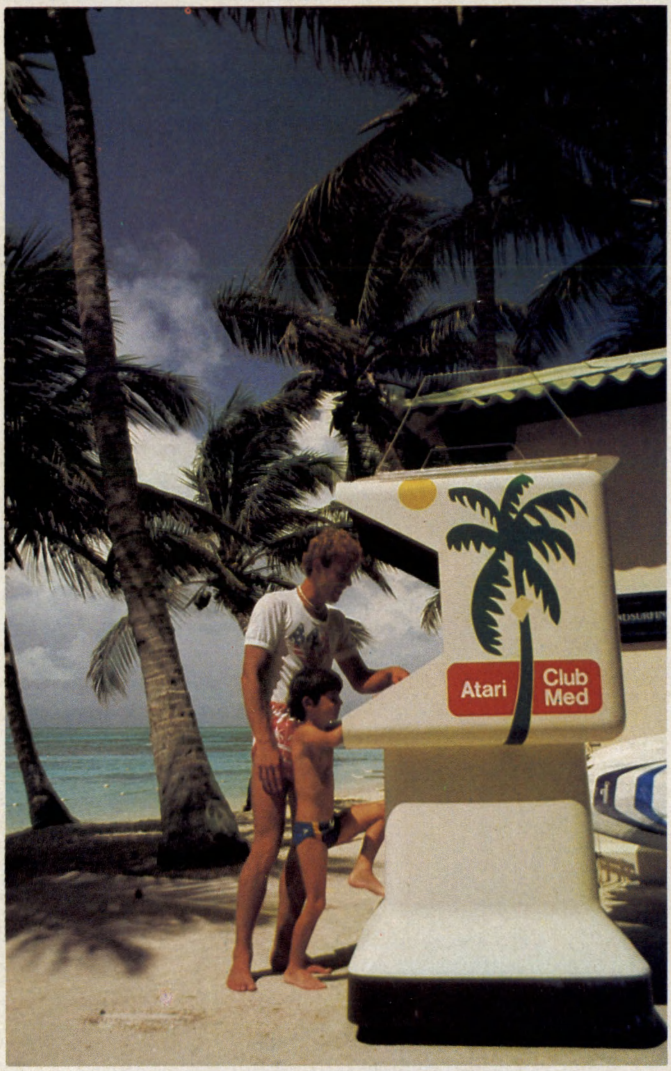
Club Mediterranee, since its inception in 1950 as a sports association in France, has taken the best elements of the traditional European vacation and added a few distinctive touches of its own to build a vacation empire known worldwide.

Today, the company operates 92 villages in 26 countries, 13 of which are located in the Western Hemisphere.

Club Med has designed its vacations to preclude the constant dole of money (no tipping), fancy wardrobes (club attire is a swimsuit and a pareo, a Tahitian sarong), and television, telephones, radio and newspapers. Club Med also features a one-price package for room, board, sports activities and entertainment, an international clientele and a very relaxed atmosphere.

In addition, Club Med takes a special interest in children and is one of the few resorts which actually encourages couples to include children in vacation plans. At five Western Hemisphere clubs, including Punta Cana, Club Med has established Mini-Clubs, for children four to seven, and Kid's Clubs, for the eight to 12 age group. Children participating in either basically get the same vacation experiences as their parents, under careful supervision, while parents are free to indulge their own pursuits.

At Punta Cana, computer instructors are assigned to the Mini-Club and Kid's Club so children get the same computer introduction opportunities. Children aged four to seven stay free with their parents (they only pay air fare), while those eight to 12 are half-price vacationers.



"Club Med has great traditions and a beautiful history," said Barouh. "Atari was able to adapt computer software to Club Med philosophy and flexibility. Technology without philosophy is not enough. But now we offer both. We are ready for tomorrow."

Club Med members can visit Punta Cana via a non-stop charter flight from Houston to Santo Domingo, Dominican Republic. Total package cost, including airfare, is under $800 per person, per week.

Linda Gilliam is a freelance writer living in Austin, TX.

Music Theory Drills

Part 2

by Duane Tutaj

In this issue I will continue with Part 2 of my Music Theory Drills. This installment will test the student on note and rest symbol identification.

In music theory, there are certain symbols that represent rhythm values. Note symbols have four parts: note head, stem, flags, and dots. Rests are different. Some are boxes while others are represented by curved and diagonal lines. Rests can also have dots.

You will be given a chance to see each symbol and its corresponding name by pressing option 5 on the menu screen.

The Note Symbol Drill starts by displaying two title screens and playing a new version of the arcade song from the last installment. This is followed by the instructions. Next comes the menu screen.

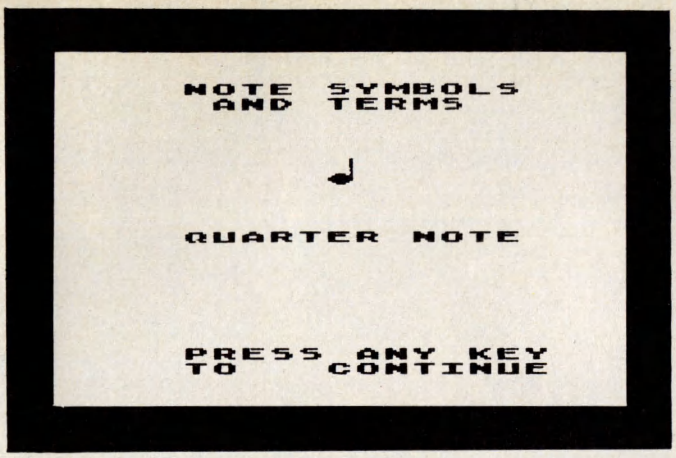
There are four options of drills and two additional options available from the menu.

Option 1 consists of a question drill on the 10 simple note and rest symbols. This quiz tells you the correct answer if your choice was incorrect. Option 2 consists of the same 10 notes and rests but only prints CORRECT or INCORRECT after your response. Option 3 adds five more rhythmic symbols and shows the correct answers. Option 4 is similar to Option 2 but includes the five additional symbols.

Option 5 displays the list of musical symbols and their corresponding terms. (See Fig. 1.) Beginners can study these symbols and their names before running the rest of the drills. Option 6 is the exit from the program.

Once a level is chosen, the DRILL screen appears and asks you to select the correct answer. A note or rest symbol drawn by a custom character set appears, followed by the three choices. By using a joystick, you can move the blue bracket behind the A, B, or C. When the blue bracket is placed correctly, push the trigger button to enter your selection. The results will appear on the bottom of the screen. When you are ready for the next question, move the joystick in any direction. This will cause the question and answers to be wiped from the screen and the next question to appear.

After the 10 or 15 questions have been answered, your results will be printed on the screen and you will be given


NOTE SYMBOLS
AND TERMS

QUARTER NOTE

PRESS ANY KEY
TO CONTINUE

Fig. 1

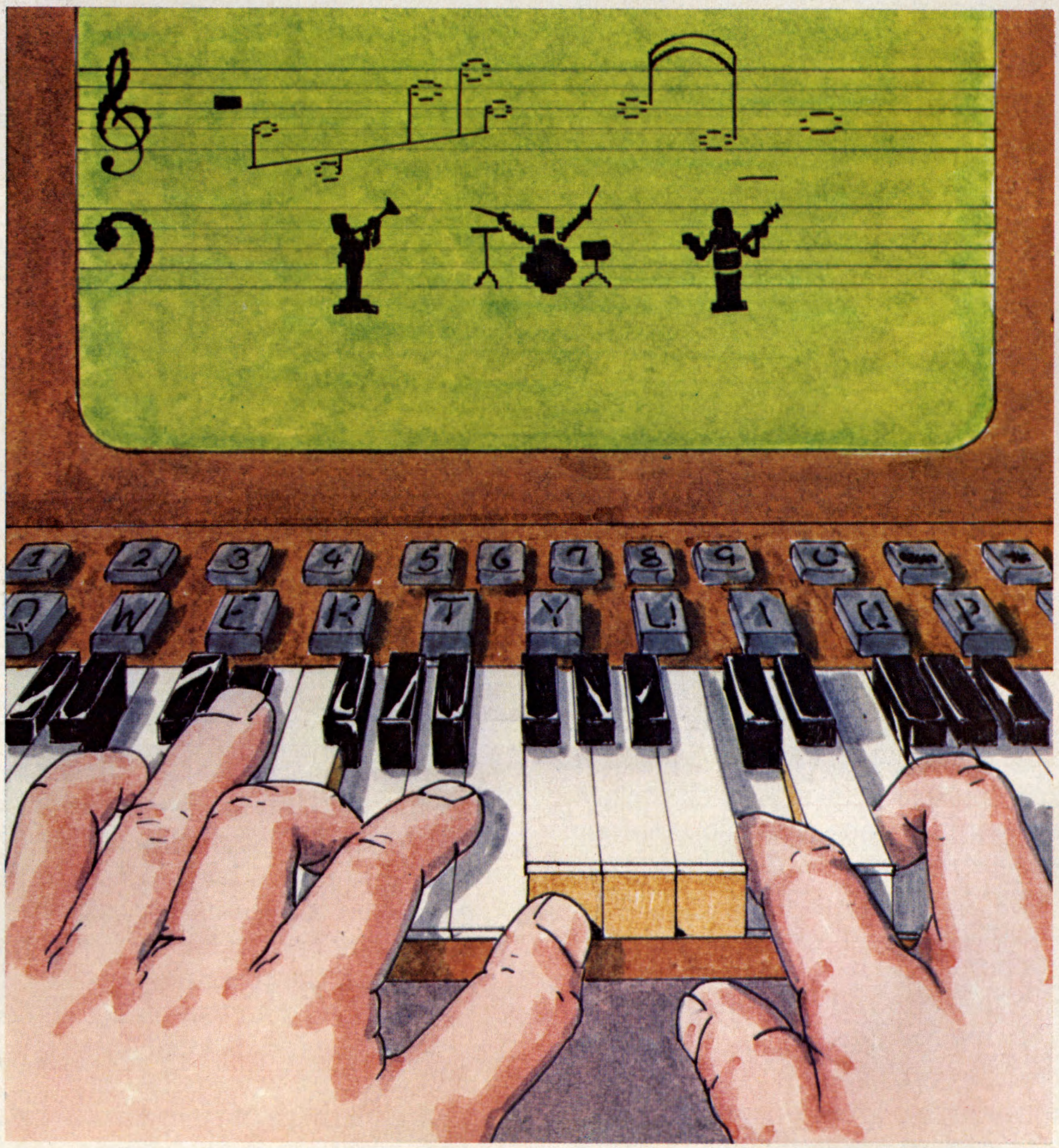
an option to run the same drill again, return to the menu, or quit.

A nice feature of this program is that whenever there is a correct match to a question, that question is removed from the list of possible questions. However, if a wrong answer is given, that question may reappear, with the answer choices being scrambled. This will force the user to read the correction and remember the correct answer.

By mastering the last Music Theory Drill installment (Note Name program) and this Note Identication program, you will be able to look at traditional music notation and translate the printed symbols to the correct names of the notes and their rhythmic equivalent. This will enable you to transfer the music into number values taken from any of the reference charts of the Atari Sound Commands.

For instance, the note located on the bottom line of the treble staff is E and has a number equivalent of 96 in the Sound command (Sound 0,96,10,10). By using the following values for the various rhythms you will be able to play each sound for its appropriate length.

Whole note	—320
Dotted half note	—240
Half note	—160
Dotted quarter note	—120
Quarter note	—80
Dotted eighth note	—60
Eighth note	—40
Sixteenth note	—20



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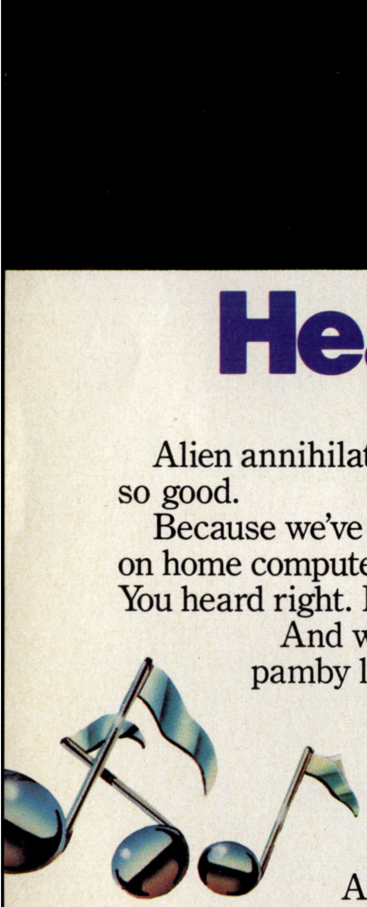

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Which ought to keep a Joystick Jockey like yourself humming right along through each and every blast, bomb and blow-up that threatens your existence.

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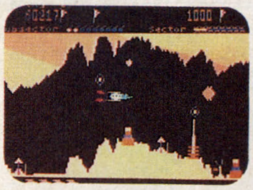
What the fuss is all about.

Why you're involved.

And perhaps of singular importance to you, how to keep from being obliterated.

real music for your Atari.*



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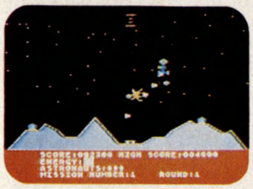

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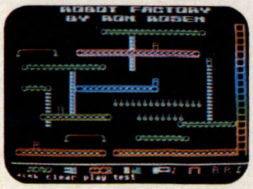

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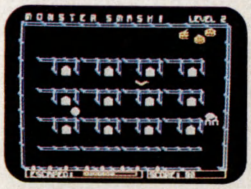
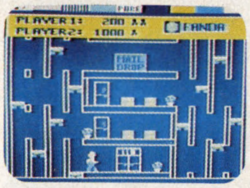


Monster Smash™ is the gravest game to ever hit the cemetery. And it's filled with a deathly strategy. What do you have to do? Mash the monsters! Let the visitors live.



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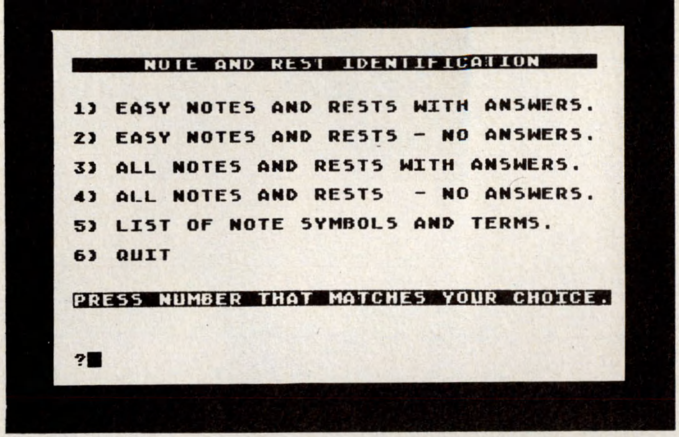


```
NOTE AND REST IDENTIFICATION

1) EASY NOTES AND RESTS WITH ANSWERS.
2) EASY NOTES AND RESTS - NO ANSWERS.
3) ALL NOTES AND RESTS WITH ANSWERS.
4) ALL NOTES AND RESTS  - NO ANSWERS.
5) LIST OF NOTE SYMBOLS AND TERMS.
6) QUIT

PRESS NUMBER THAT MATCHES YOUR CHOICE.

?
```

Fig. 2

If you need a rest, use the sound statement of Sound 0,0,0,0 for the appropriate length. Here is an example of the first four notes of the song *JOY TO THE WORLD*.

```
10 SOUND 0,60,10,10
20 FOR J=1 TO 80:NEXT J
30 SOUND 0,64,10,10
40 FOR J=1 TO 60:NEXT J
50 SOUND 0,72,10,10
60 FOR J=1 TO 20:NEXT J
70 SOUND 0,81,10,10
80 FOR J=1 TO 120:NEXT J
90 SOUND 0,0,0,0
```

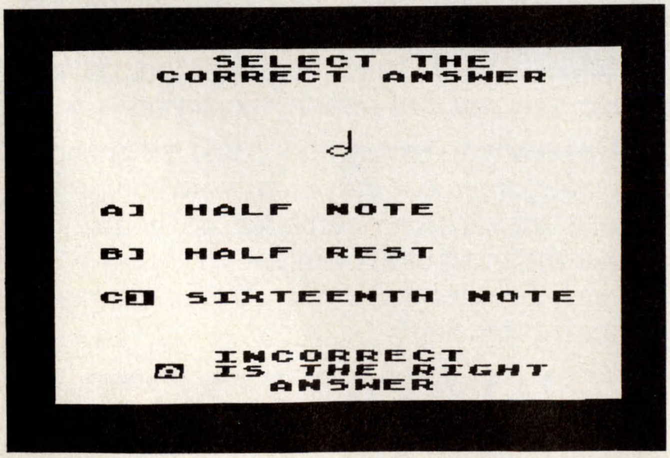
This type of programming works but is very inefficient. See my use of arrays in the arcade music section of the Note Identification program for a tighter use of code.

In the next installment I will have a slot machine game that makes the user determine the combined rhythmic total of the various notes and rests.

Program Description

The program starts by initializing five string variables and two arrays. The string variables will contain the answer choices and also will print the music symbols to the screen with a custom character set. The two arrays are for keeping track of which questions have been answered correctly and the arcade music sound routine. The keyboard is opened up for the GET command and the screen is made blank to increase the speed of moving and drawing the custom character set.

Lines 100 to 160 jump to the subroutines that write the character set, draw the title screen, play the arcade music, print instructions and display the menu screen. (See Fig. 2.) The question array is also filled with zeros and the counters and scoring variables are set before the drill begins.



```
SELECT THE
CORRECT ANSWER

𝅗𝅥

A] HALF NOTE

B] HALF REST

C] SIXTEENTH NOTE

INCORRECT
A IS THE RIGHT
ANSWER
```

Fig. 3

Lines 200 to 210 print the Drill program heading and then goes to the main loop at line 1000.

Lines 299 to 350 contain the various sound routines used in the program.

Lines 1000 to 1320 contain the main loop of the program. The first step is to go and get a note or rest symbol. The program then places two more possible answers in the variables B and C. The RND function then generates a number from 1 to HM (which is either 10 or 15). A check is made to see if the chosen music symbol is also that number, if not, then a third choice is generated. This all takes place in lines 1050 to 1080.

Next, the music symbol and answer choices are printed to the screen. Lines 1200 to 1216 contain the joystick routine that moves the blue bracket corresponding to your choice of answers. By adding 128 to CHR$(93) we get a blue bracket. To print the gold bracket just use CHR$(93).

If the joystick is moved up, S is given a value; a sound is played and then a jump is made to the correct line that positions and prints the new blue bracket. Next, a gold bracket is printed in the former location. A similar set of commands is followed when the joystick is moved down.

After the bracket is moved (or if you do not move the joystick) a check of the trigger is made to see if you have entered your selection. If not, there is a return to line 1203 to read the joystick again.

If you selected an answer, a check is made to see if it matches the correct answer (A). If you are correct then the right variable R is incremented. A 1 is placed in the question array to prevent using that question again and then the correct sound is played. The message CORRECT is printed to the screen and then a jump is made to 1300 to check for an end of quiz, followed by a check to see if the joystick is moved. If the joystick is moved then the music symbol and answers are all erased from the screen with an appropriate sound. The program then returns to line 1000 and starts the main loop again.

If a question is answered wrong, the variable W is incremented, the incorrect sound is played and the INCORRECT message is shown depending on whether the correct answer should be displayed or not. (See Fig. 3.) This is all done in lines 1230 to 1260. A jump to 1300 is made to check for end of quiz. If not, the screen is erased and the loop is started over again.

Lines 1500 to 1655 are the scoring routine with the results printed on the screen. You may run this quiz again, go to the menu screen or quit.

Lines 2000 to 2115 contain the routine that selects the music symbol, checks to see if it had been used before, gets the position for the correct answer and prints the music symbol to the screen.

Lines 3000 to 3330 get the answer strings and print them on the screen based on where the correct answer will be.

Lines 15000 to 15100 contain a series of short routines that will move the existing ROM character set to RAM and then change a couple of characters.

Lines 20000 to 20070 contain the title screens and call the arcade music routine at line 25000.

Lines 20100 to 20175 contain the menu screen routine.

The arcade music routine is located in lines 25000 to

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★★★

26155. A short explanation on how this works will enable you to use this same routine in your programs.

Restore the correct Data line to make sure that the correct data is read into the sound array. Then read four values by using a short for-next loop. If the Data statement contains the value of 9999 then the routine will end. Now that the four values have been placed into the YY array we are able to play four voices at one time by using these values in the four Sound statements.

The use of Setcolor in line 25315 just changes the colors in the title screen. After the tune is played, turn off all the Sound statements and then return to the rest of the program.

You will notice that I do not use any for-next loops for delays in this routine. That is because each note is based on the shortest value needed in a song. In this tune, the shortest value is an eighth note and therefore, each of the four values represent one eighth note value of sound. When a longer value is wanted just repeat the same pitch number in the next four Data values. Look at line 26000 and you will see that while the 1st and 5th pitch number changes the 4th and 8th number stays the same. This results in the melody playing two different eighth notes while the bass line holds a quarter note. Careful examination of this routine will give you better insight into how you can play four-part songs in any of your programs.

Lines 28000 to 28120 print the various music symbols and their corresponding term names to the screen as requested from the menu screen.

Lines 29000 to 29110 contain the routine that prints the instructions on the screen.

I hope that this program will generate many ideas on how to use the various routines in your own programs. If you come up with any interesting combinations, let me know.

Music Theory Drills

```
10 REM ***** MUSIC THEORY DRILLS PART
2 *****
20 REM ***** BY DUANE TUTAJ
 *****
30 REM ***** COPYRIGHT 1983
 *****
50 DIM N$(43),B$(43),C$(43),N1$(2),N2$
(2),INV$(50)
55 DIM Q(15),YY(4)
60 OPEN #2,4,0,"K:":POKE 559,0
100 REM GET MUSIC SYMBOLS INTO CHARACT
ER SET
110 GOSUB 15000
112 REM GO GET TITLE SCREEN
114 GOSUB 20000
115 REM GET INSTRUCTIONS
116 GOSUB 29000
117 REM GET MENU SCREEN
118 GOSUB 20100
120 FOR J=1 TO 15:Q(J)=0:NEXT J
160 NUM=0:R=0:W=0:ST=10
200 GRAPHICS 17:POKE 756,CS/256:POSITI
ON 2,0
210 ? #6;"   SELECT THE        CORRECT
 ANSWER":GOTO 1000
299 REM SOUND ROUTINES
300 FOR J=12 TO 0 STEP -1:FOR JJ=1 TO
4:SOUND 0,20,10,J:NEXT JJ:NEXT J:SOUND
 0,0,0,0:RETURN
310 FOR J=0 TO 14:FOR JJ=1 TO 1:SOUND
0,30,10,J:NEXT JJ:NEXT J:SOUND 0,0,0,0
:RETURN
320 SOUND 0,250,14,10:FOR J=1 TO 30:NE
XT J:SOUND 0,0,0,0:RETURN
340 SOUND 0,230,8,10:FOR J=1 TO 30:NEX
T J:SOUND 0,0,0,0:RETURN
350 FOR J=0 TO 14:FOR JJ=1 TO 1:SOUND
0,20,8,J:NEXT JJ:NEXT J:SOUND 0,0,0,0:
RETURN
1000 REM MAIN LOOP
1010 REM GET NOTE
1020 GOSUB 2000
1030 REM PLACE CORRECT AND INCORRECT A
NSWERS IN ARRAY
1050 B=INT(RND(0)*HM)+1
1060 IF B=N THEN GOTO 1050
1070 C=INT(RND(0)*HM)+1
1080 IF C=B OR C=N THEN GOTO 1070
1090 REM PRINT THREE ANSWERS TO SCREEN
1100 GOSUB 3000
1200 REM JOYSTICK ROUTINE TO GET ANSWE
R
1201 ST=10:POSITION 2,10:? #6;CHR$(93+
128)
1203 IF STICK(0)=15 THEN S=0
1204 IF STICK(0)=14 THEN S=-1:GOSUB 31
0:GOTO 1209
1205 IF STICK(0)=13 THEN S=1:GOSUB 310
1209 IF S=-1 AND ST=10 THEN ST=16:POSI
TION 2,10:? #6;CHR$(93):POSITION 2,16:
? #6;CHR$(93+128):GOTO 1214
1210 IF S=-1 THEN ST=ST-3:POSITION 2,S
T+3:? #6;CHR$(93):POSITION 2,ST:? #6;C
HR$(93+128):GOTO 1214
1211 IF S=1 AND ST=16 THEN ST=10:POSIT
ION 2,16:? #6;CHR$(93):POSITION 2,10:?
 #6;CHR$(93+128):GOTO 1214
1212 IF S=1 THEN ST=ST+3:POSITION 2,ST
-3:? #6;CHR$(93):POSITION 2,ST:? #6;CH
R$(93+128)
1214 FOR J=1 TO 30:NEXT J
1215 IF STRIG(0)=0 THEN GOTO 1220
1216 IF STRIG(0)=1 THEN GOTO 1203
1220 AN=(ST-7)/3:IF AN=A THEN R=R+1:Q(
N)=1:GOSUB 300:POSITION 6,20:? #6;"COR
RECT":GOTO 1300
1230 IF MENU=2 OR MENU=4 THEN GOTO 126
0
1240 W=W+1:GOSUB 320:POSITION 5,20:? #
6;"INCORRECT           ";CHR$(192+A);
1250 ? " IS THE RIGHT              ANSWER"
:GOTO 1300
1260 W=W+1:GOSUB 320:POSITION 5,20:? #
6;"INCORRECT"
1300 FOR J=1 TO 75:NEXT J
1301 IF STICK(0)=15 THEN GOTO 1301
1304 GOSUB 350:POSITION 2,20:? #6;"
                 "

1305 POSITION 2,21:? #6;"
                         "

1306 NUM=NUM+1:IF NUM=HM THEN GOTO 150
0
1310 POSITION 4,10:? #6;"
                 "
```

```
1311 POSITION 4,13:? #6;"
                    "
1312 POSITION 4,16:? #6;"
                    "
1320 GOTO 1000
1500 REM SCORING ROUTINE
1510 IF HM=10 THEN SCORE=R*10
1520 IF HM=15 THEN SCORE=INT(R*6.7)
1530 GRAPHICS 17:POKE 756,224
1540 POSITION 4,0:? #6;"ON THIS QUIZ"
1545 POSITION 7,1:? #6;"YOU HAD"
1550 POSITION 6,4:? #6;R;" RIGHT"
1560 POSITION 6,6:? #6;W;" WRONG"
1570 POSITION 4,9:? #6;"FOR A SCORE OF
"
1580 POSITION 9,11:? #6;SCORE;"%"
1590 FOR J=1 TO 200:NEXT J
1600 POSITION 7,13:? #6;"PRESS":POSITI
ON 7,15:? #6;"space":POSITION 4,16:? #
6;"TO RUN AGAIN"
1601 POSITION 9,18:? #6;"m":POSITION 4
,19:? #6;"TO SEE MENU"
1602 POSITION 8,21:? #6;"esc":POSITION
 6,22:? #6;"TO   QUIT"
1650 POKE 764,255:GET #2,K:IF K=32 THE
N GOTO 120
1651 IF K=77 THEN GOTO 118
1652 IF K=27 THEN END
1655 GOSUB 340:GOTO 1600
2000 REM NOTE LOOP
2010 N=INT(RND(0)*HM)+1
2015 IF Q(N)=1 THEN GOTO 2010
2020 GOSUB 2100+N
2030 A=INT(RND(0)*3)+1
2040 POSITION 9,5:? #6;N1$:POSITION 9,
6:? #6;N2$
2050 RETURN
2100 REM PRINT NOTE SYMBOLS TO SCREEN
2101 N1$="  ":N2$=") ":RETURN
2102 N1$="$ ":N2$="#*":RETURN
2103 N1$="$ ":N2$="# ":RETURN
2104 N1$="$ ":N2$="+ ":RETURN
2105 N1$="$,":N2$="+ ":RETURN
2106 N1$="$-":N2$="+ ":RETURN
2107 N1$="  ":N2$="( ":RETURN
2108 N1$="  ":N2$="/ ":RETURN
2109 N1$="  ":N2$="' ":RETURN
2110 N1$="  ":N2$="& ":RETURN
2111 N1$="$ ":N2$="+*":RETURN
2112 N1$="$,":N2$="+*":RETURN
2113 N1$="  ":N2$="'.":RETURN
2114 N1$="  ":N2$="&.":RETURN
2115 N1$="  ":N2$="% ":RETURN
3000 REM ANSWERS TO SCREEN ROUTINE
3010 RESTORE 3100+N:READ N$
3020 RESTORE 3100+B:READ B$
3030 RESTORE 3100+C:READ C$
3040 ON A GOTO 3200,3250,3300
3100 REM ANSWER STRINGS
3101 DATA whole note
3102 DATA dotted half note
3103 DATA half note
3104 DATA quarter note
3105 DATA eighth note
3106 DATA sixteenth note
3107 DATA whole rest
3108 DATA half rest
```

```
3109 DATA quarter rest
3110 DATA eighth rest
3111 DATA dotted quarter      note
3112 DATA dotted eighth       note
3113 DATA dotted quarter      rest
3114 DATA dotted eighth       rest
3115 DATA sixteenth rest
3200 POSITION 1,10:? #6;"A] ";N$
3210 POSITION 1,13:? #6;"B] ";B$
3220 POSITION 1,16:? #6;"C] ";C$
3230 RETURN
3250 POSITION 1,10:? #6;"A] ";B$
3260 POSITION 1,13:? #6;"B] ";N$
3270 POSITION 1,16:? #6;"C] ";C$
3280 RETURN
3300 POSITION 1,10:? #6;"A] ";B$
3310 POSITION 1,13:? #6;"B] ";C$
3320 POSITION 1,16:? #6;"C] ";N$
3330 RETURN
6000 FOR INV=1 TO LEN(INV$)
6010 ? #6;CHR$(ASC(INV$(INV))+128);
6020 NEXT INV:? #6:RETURN
7000 FOR INV=1 TO LEN(INV$)
7010 ? CHR$(ASC(INV$(INV))+128);
7020 NEXT INV:RETURN
15000 REM NEW CHARACTER SET
15010 REM MOVE CHARACTER SET FROM ROM
15015 DIM CH$(32)
15017 RESTORE 15030
15020 FOR J=1 TO 32:READ Y:CH$(J)=CHR$
(Y):NEXT J
15030 DATA 104,104,133,204,104,133,203
,104,133,206,104,133,205,162,4,160,0,1
77,203,145
15040 DATA 205,136,208,249,230,204,230
,206,202,208,240,96
15050 REM MOVE CHARACTER SET TO SAFE A
REA
15060 POKE 106,PEEK(106)-5:GRAPHICS 0:
CS=(PEEK(106)+1)*256:Y=USR(ADR(CH$),57
344,CS)
15070 REM CHANGE CHARACTERS TO NOTES
15072 RESTORE 15090
15080 FOR J=CS+24 TO CS+127:READ Y:POK
E J,Y:NEXT J
15090 DATA 1,1,29,35,65,65,34,28,0,0,1
,1,1,1,1,1,65,35,158,68,56,16,32,64,65
,35,30,4,8,16,32,64
15091 DATA 70,60,8,22,60,8,16,32,0,255
,60,60,0,0,0,0,0,0,28,34,65,65,34,28,0
,0,0,0,96,96,0,0
15092 DATA 1,1,29,63,127,127,62,28,0,0
,192,32,16,8,8,0,0,0,224,16,200,36,20,
16,96,96
15093 DATA 0,0,0,0,0,0,0,0,60,60,255,0
,0,0
15100 POKE 559,34:RETURN
20000 GRAPHICS 17:POKE 710,210
20005 POSITION 1,3:INV$="music theory
drills":GOSUB 6000
20010 POSITION 7,8:? #6;"PART 2"
20020 POSITION 4,13:? #6;"note and res
t":POSITION 4,15:? #6;"identification"
20025 GOSUB 25000
20030 GRAPHICS 17:POSITION 9,3:? #6;"b
y"
20040 POSITION 4,10:INV$="DUANE  TUTAJ
```

```
":GOSUB 6000
20050 POSITION 2,21:? #6;"COPYRIGHT  1
983"
20060 GOSUB 25000
20070 FOR Z=1 TO 100:NEXT Z:RETURN
20100 GRAPHICS 0:POKE 710,112:POKE 756
,224
20105 ? :? :INV$="      NOTE AND REST I
DENTIFICATION     ":GOSUB 7000:?
20110 ? :? :? "1) EASY NOTES AND RESTS
 WITH ANSWERS."
20115 ? :? "2) EASY NOTES AND RESTS -
NO ANSWERS."
20120 ? :? "3) ALL NOTES AND RESTS WIT
H ANSWERS."
20130 ? :? "4) ALL NOTES AND RESTS  -
NO ANSWERS."
20140 ? :? "5) LIST OF NOTE SYMBOLS AN
D TERMS."
20145 ? :? "6) QUIT"
20150 ? :? :INV$="PRESS NUMBER THAN MA
TCHES YOUR CHOICE.":GOSUB 7000:?
20160 ? :? :POKE 764,255:? "?";:GET #2
,K:GOSUB 300
20165 IF K=49 THEN MENU=1:HM=10:RETURN

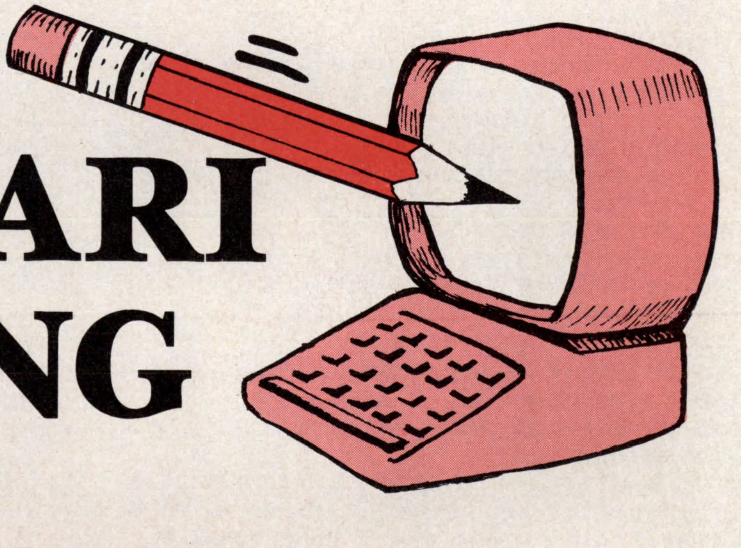
20166 IF K=50 THEN MENU=2:HM=10:RETURN

20167 IF K=51 THEN MENU=3:HM=15:RETURN

20168 IF K=52 THEN MENU=4:HM=15:RETURN
20169 IF K=53 THEN GOTO 28000
20170 IF K=54 THEN GRAPHICS 0:END
20172 ? CHR$(253):FOR I=1 TO 200:NEXT
I
20175 GOTO 20100
25000 REM PLAY ARCADE MUSIC
25010 RESTORE 26000
25300 FOR Z=0 TO 3:READ Y:IF Y=9999 TH
EN GOTO 25320
25305 YY(Z)=Y:NEXT Z
25310 SOUND 0,YY(0),10,10:SOUND 1,YY(1
),10,4:SOUND 2,YY(2),10,4:SOUND 3,YY(3
),10,10
25315 SETCOLOR 2,INT(16*RND(1)),6
25317 GOTO 25300
25320 FOR Z=0 TO 3:SOUND Z,0,0,0:NEXT
Z:RETURN
26000 DATA 81,0,0,162,64,108,128,162,0
,0,0,217,53,108,128,217
26010 DATA 40,0,0,162,42,108,128,162,4
7,0,0,217,53,108,128,217
26020 DATA 64,0,0,162,53,108,128,162,0
,0,0,217,47,108,128,217
26030 DATA 53,108,128,162,53,0,0,217,0
,0,0,193,0,0,0,173
26040 DATA 81,0,0,162,64,108,128,162,0
,0,0,217,53,108,128,217
26050 DATA 40,0,0,162,42,108,128,162,4
7,0,0,217,53,108,128,217
26060 DATA 72,0,0,173,81,121,144,173,0
,0,0,217,64,121,144,217
26070 DATA 72,121,144,173,72,0,0,217,0
,0,0,193,0,0,0,173
26080 DATA 81,0,0,162,64,108,128,162,0
,0,0,217,53,108,128,217
26090 DATA 40,0,0,162,42,108,128,162,4
7,0,0,217,53,108,128,217
26100 DATA 64,0,0,162,53,108,128,162,0
,0,0,217,47,108,128,217
26110 DATA 53,108,128,162,53,0,0,217,0
,0,0,193,0,0,0,173
26120 DATA 40,0,0,162,42,108,128,162,4
7,0,0,217,53,108,128,217
26130 DATA 64,0,0,162,72,108,128,162,8
1,0,0,217,72,108,128,217
26140 DATA 64,0,0,162,81,108,128,162,7
2,0,0,217,85,121,144,217
26150 DATA 81,108,128,162,81,108,128,1
62,81,108,128,162,0,0,0,0
26155 DATA 9999
28000 GRAPHICS 17:POKE 756,CS/256:POKE
 752,1
28010 ? #6;"    NOTE SYMBOLS":? #6;"
  AND TERMS"
28020 FOR J=1 TO 50:NEXT J
28030 FOR I=1 TO 15
28040 GOSUB 2100+I
28050 POSITION 9,5:? #6;N1$:POSITION 9
,6:? #6;N2$
28060 RESTORE 3100+I:READ N$:POSITION
4,10:? #6;N$
28070 FOR JJ=1 TO 50:NEXT JJ
28080 POSITION 4,18:? #6;"PRESS ANY KE
Y     TO   CONTINUE"
28090 POKE 764,255:GET #2,K:GOSUB 300
28100 POSITION 4,10:? #6;"
                    ":POSITION 4,18
28105 ? #6;"
    "
28110 NEXT I
28120 GOTO 20100
29000 GRAPHICS 0:POKE 710,112:POKE 756
,224
29005 INV$="                INSTRUCTIONS
          ":GOSUB 7000:?
29010 ? "There are FOUR levels to this
 drill.":? :? "You will be given a cho
ice between"
29020 ? "easy notes and rests or all n
otes and rests. You can also choose wh
ether";
29030 ? "    you wish to see the corre
ct":? "answer if you picked the wrong
letter."
29040 ? "To make your selection, conne
ct     a joystick to controller jack
 one."
29050 ? "Move the joystick up or down
until     the blue bracket is next to y
our"
29060 ? "selection. Press the joystick
 button  and the result will be shown.
"
29070 ? :? "To advance to the next que
stion move  the joystick in any direct
ion."
29080 ? :? "You will be shown your sco
re after    the drill is finished and
will be"
29090 ? "asked to play again, go to th
e menu   or quit."
29100 ? "     ";:INV$="Press any key to
 continue":GOSUB 7000
29110 POKE 764,255:GET #2,K:GOSUB 300:
RETURN
```

THE ATARI DRAWING BOARD

by Vern L. Mastel



Inspired by the Apple Graphics Tablet, the following *Drawing Board* program uses a number of the Atari's special features, including player-missile graphics. Player-Missile graphics let you mix text from the Graphics Mode 0 with the high resolution Graphics Mode 8 screen, without using fancy tricks like display list interrupts. The program runs on any Atari computer with no modifications.

The program is very simple. You control all drawing from two joysticks (which need not be actual joysticks), and you're guided by two cursors placed on the screen. The cursors are single resolution players which take priority over all screen images.

These cursors mark the ends of lines to be plotted when in the line mode. They mark the opposite corners of rectangles when in the box mode. They mark the center and radius of a circle when in the circle mode. When in the draw or print mode, one cursor is disabled (actually positioned off the edge of the screen), and the other is used to guide all of the screen work.

The program is broken into three sections: cursor positioning, command processing and initialization routines. Lines 100 to 184 handle all of the positioning chores. The status of the joysticks plugged into ports 1 and 2 is read and translated into cursor positions on the screen and the triggers on the sticks are read at the same time.

All the while, the program continuously monitors the keyboard, checking for changes in the operating mode, translating and reading what is going on between each and every point plotted on the screen. Remember this, if you feel the cursor motion is too slow.

The initialization routine is used only once and sets up the parameters for the program. It also sets up the machine language routines that allow you to move vertically. These routines are tucked away into page six in memory.

Lines 10 through 90 are the main subroutines for screen processing. Line 10 clears the screen and restores the cursor. Lines 20, 30 and 40 plot color changes. Line 45 is very important. Because the screen coordinates for player-missle, graphics do not correspond to the coordinates for plotting on the playfield. I had to translate the actual position of the player-missle cursors into normal playfield coordinates. Line 45 calculates these.

Lines 50 through 85 check the range. This routine ensures that your plotting remains inside the normal playfield boundaries.

You should pay special attention to the section of the program in Lines 1200 to 1320. This is a very, very fast load and save routine or saving your drawings to a disk. (It will work with a cassette as well, but more slowly.) This routine comes straight from the pages of De Re Atari (B-37) and has been elaborated on in Softside Magazine, (Issue #33, page 82).

The routine uses the CIO to move the screen image very rapidly. It copies all of screen memory and sends it to the disk. Loading the image, it reverses the process, and loads the bytes coming from the disk directly into screen memory. The whole process of saving or loading takes less than 30 seconds. The only drawback is that the routine gobbles up large quantities of disk space, about 60 sectors per screen. See Table 1 for a review of *Drawing Board's* commands.

The Vertical Move

Two different routines move the cursors. To move horizontally simply increment or decrement the value in the PM position registers located at decimal 5324B and 53249.

Moving vertically is a bit more complicated. I used a machine language subroutine that rapidly moves the player's bit patterns through the memory. This routine is not my own creation. I found it on page 318 of Your Atari Computer, A Guide to the 400/800 by Poole, Martin and Cook. I did adapt it to handle the motion of two players, by making use of several additional unused memory locations. It is simple and very effective.

The command process changes operating modes and colors to plot or draw. Remember, even though you draw in Graphics 8, you still have only two colors to work with, 0 and 1. This means that if you want to erase a line, you simply plot it again in color 0!

To plot in color 1, press joystick trigger 1. To plot in color 0 (erase, if

L:Line mode, the cursors mark the endpoints of the line to be plotted.

D:Draw mode, one cursor is removed for the screen.

C:Circle mode, one cursor plots the center of the circle and the other sets the radius. For this to work correctly the cursors must be in line horizontally on the screen.

B:Box mode, the cursors mark the opposite corners of the rectangle to be plotted.

P:Print mode allows text to be added to the drawing at the specified position. To escape without printing enter an asterisk.

I:Inverts the screen, black to white.

N:Returns the screen to its normal mode.

F:Fill mode works like The Box mode except that the area bounded by the rectangle is filled with a solid color.

Control L:Load from specified file. To load from a disk file specify D:filename. To load from a cassette file just enter C:.

Control S:Save to specified file. The same format as outlined above applies to saving. D:file name for disk and C:for cassette.

Control C:Clear the screen without saving the picture.

you prefer), press joystick trigger 0.

Note, if you select inverse screen display, the colors will be reversed. Holding down a trigger button, while moving a cursor, will produce some very interesting effects. By all means experiment!

Lastly, what about joysticks?

For my current drawing box, I have a unit which has 10 push buttons on it. Four are for each joystick, and the other two for the triggers. I find this arrangement infinitely preferable to joysticks simply because it can be run with one hand.

Atari Drawing Board

```
1 REM ATARI DRAWING BOARD BY VERN L. M
ASTEL
5 GOTO 2000
10 ? CHR$(125):POKE HPOS1,X1:RETURN
20 IF T1=0 THEN COLOR 1:RETURN
30 IF T2=0 THEN COLOR 0:RETURN
40 POP :GOTO CRSR
45 XP=(X-44)*2:YP=Y-28:XP1=(X1-44)*2:Y
P1=Y1-28
50 IF XP<0 THEN XP=0
55 IF XP1<0 THEN XP1=0
60 IF XP>319 THEN XP=319
65 IF XP1>319 THEN XP1=319
70 IF YP<0 THEN YP=0
75 IF YP1<0 THEN YP1=0
80 IF YP>159 THEN YP=159
85 IF YP1>159 THEN YP1=159
90 RETURN
100 A=STICK(0):B=STICK(1):T1=STRIG(0):
T2=STRIG(1):ON PEEK(764)<>255 GOTO 310
110 IF A=11 THEN X=X-1:POKE HPOS,X
115 IF A=10 THEN X=X-1:Y=Y-1:POKE HPOS
,X:D=USR(1536)
120 IF A=7 THEN X=X+1:POKE HPOS,X
125 IF A=6 THEN X=X+1:Y=Y-1:POKE HPOS,
X:D=USR(1536)
130 IF A=13 THEN D=USR(1553):Y=Y+1
135 IF A=9 THEN X=X-1:Y=Y+1:POKE HPOS,
X:D=USR(1553)
140 IF A=14 THEN D=USR(1536):Y=Y-1
145 IF A=5 THEN X=X+1:Y=Y+1:POKE HPOS,
X:D=USR(1553)
150 IF B=11 THEN X1=X1-1:POKE HPOS1,X1
155 IF B=10 THEN X1=X1-1:Y1=Y1-1:POKE
HPOS1,X1:D=USR(1568)
160 IF B=7 THEN X1=X1+1:POKE HPOS1,X1
165 IF B=6 THEN X1=X1+1:Y1=Y1-1:POKE H
POS1,X1:D=USR(1568)
170 IF B=13 THEN D=USR(1585):Y1=Y1+1
175 IF B=9 THEN X1=X1-1:Y1=Y1+1:POKE H
POS1,X1:D=USR(1585)
180 IF B=14 THEN D=USR(1568):Y1=Y1-1
184 IF B=5 THEN X1=X1+1:Y1=Y1+1:POKE H
POS1,X1:D=USR(1585)
185 ON KC=76 GOTO 510:ON KC=66 GOTO 61
0:ON KC=70 GOTO 710:ON KC=68 GOTO 810:
IF KC=73 THEN POKE 710,14
186 ON KC=80 GOTO 1410:ON KC=67 GOTO 1
105:ON KC=12 GOTO 1300:ON KC=19 GOTO 1
200:IF KC=78 THEN POKE 710,148
200 GOTO CRSR
310 GET #2,KC:ON KC=76 GOTO 500:ON KC=
66 GOTO 600:ON KC=70 GOTO 700:ON KC=68
 GOTO 800
320 ON KC=67 GOTO 1100:ON KC=12 GOTO 1
300:ON KC=80 GOTO 1400:ON KC=19 GOTO 1
200
330 IF KC=3 THEN CLR :CLOSE #1:CLOSE #
2:GOTO 2000
340 GOTO CRSR
500 GOSUB POS:? "LINE MODE ENGAGED"
510 GOSUB COLR:GOSUB XC:PLOT XP,YP:DRA
WTO XP1,YP1:GOTO CRSR
600 GOSUB POS:? "BOX MODE ENGAGED"
610 GOSUB COLR:GOSUB XC:PLOT XP,YP:DRA
WTO XP1,YP:DRAWTO XP1,YP1:DRAWTO XP,YP
1:DRAWTO XP,YP:GOTO CRSR
700 GOSUB POS:? "FILL MODE ENGAGED"
710 IF Y>Y1 THEN A=-1
720 IF Y<Y1 THEN A=1
760 GOSUB COLR:GOSUB XC:FOR I=YP TO YP
1 STEP A:PLOT XP,I:DRAWTO XP1,I:NEXT I
:GOTO CRSR
800 GOSUB POS:? "DRAW MODE ENGAGED"
810 POKE HPOS1,0
850 GOSUB COLR:GOSUB XC:PLOT XP,YP:GOT
O CRSR
1100 GOSUB POS:? "CIRCLE MODE ENGAGED"
1105 GOSUB COLR:R=SQR((X-X1)*(X-X1)+(Y
-Y1)*(Y-Y1)):R=INT(R+R):RAD
1110 FOR TH=0 TO 6.25 STEP 0.05:X2=INT
(R*SIN(TH)):Y2=INT(R*COS(TH)):XP=((X-4
4)*2)-X2:YP=Y-28-Y2
1170 GOSUB CHK:PLOT XP,YP:NEXT TH:GOTO
 CRSR
1200 ? CHR$(125):? "SAVE TO WHICH FILE
?":INPUT LABEL$:OPEN #1,8,0,LABEL$
1210 DL=PEEK(88)+256*PEEK(89):TOP=DL+6
359:BYTES=TOP-DL
1220 HI=INT(BYTES/256):LO=BYTES-(HI*25
6):POKE 850,11:POKE 852,PEEK(88):POKE
```

```
853,PEEK(89):POKE 856,LO:POKE 857,HI
1230 DUMMY=USR(ADR(IO$),16):CLOSE #1:?
 "SAVE COMPLETE":KC=0:GOTO 2030
1300 ? CHR$(125):? "LOAD FROM WHICH FI
LE?":INPUT LABEL$:OPEN #1,4,0,LABEL$
1310 POKE 850,7:POKE 852,PEEK(88):POKE
 853,PEEK(89):POKE 856,255
1320 POKE 857,255:DUMMY=USR(ADR(IO$),1
6):CLOSE #1:? "LOAD COMPLETE":KC=0:GOT
O 2030
1400 GOSUB POS:? "PRINT MODE ENGAGED-E
NTER LABEL":INPUT LABEL$
1405 START=PEEK(88)+256*PEEK(89)+319
1410 IF LABEL$="*" THEN POKE TPOS,0:?
X$:KC=255:GOTO CRSR
1420 XP=((X-44)/4):YP=Y-28:START=START
+XP+YP*40:FOR L=1 TO LEN(LABEL$):START
=START-319:W$=LABEL$(L,L)
1430 PLACE=((ASC(W$)-32)*8):FOR T=1 TO
 8:START=START+40:POKE START,PEEK(5734
4+PLACE+T):NEXT T:NEXT L
1440 KC=255:GOTO CRSR
1900 ? CHR$(253):? CHR$(125):? "ERROR,
PLEASE SELECT MODE AGAIN":FOR Z=1 TO 3
00:NEXT Z:? CHR$(125):KC=0:GOTO CRSR
1999 END
2000 TRAP 1900:GRAPHICS 8:OPEN #2,4,0,
"K":DIM W$(1),LABEL$(20),IO$(7):RESTOR
E
2005 IO$="hhh LV ":IO$(4,4)=CHR$(170):
IO$(7)=CHR$(228)
2010 READ CRSR,TPOS,HPOS,HPOS1,CHK,KC,
X,Y,X1,Y1,XC,COLR,POS
2020 DATA 100,656,53248,53249,50,255,1
00,110,120,110,45,20,10
2025 POKE HPOS,X:POKE HPOS1,X1
2030 I=PEEK(106)-8:POKE 54279,I:POKE 5
3277,2:POKE 53256,0:POKE 53257,0:POKE
559,62:POKE 704,26:POKE 705,26
2035 START=I*256:J=START+1024:K=START+
1280
2040 RESTORE 2200:FOR P1=J+Y TO J+Y+8:
READ Z:POKE P1,Z:NEXT P1
2045 FOR P2=K+Y1 TO K+Y1+8:READ Z:POKE
 P2,Z:NEXT P2
2056 JSTART=J+Y:KSTART=K+Y1:POKE 204,I
NT(JSTART/256):POKE 203,JSTART-(PEEK(2
04)*256)-1:POKE 205,8
2058 POKE 207,INT(KSTART/256):POKE 206
,KSTART-(PEEK(207)*256)-1:POKE 208,8
2060 RESTORE 2120:FOR P=1536 TO 1567:R
EAD Z:POKE P,Z:NEXT P
2070 RESTORE 2140:FOR P=1568 TO 1599:R
EAD Z:POKE P,Z:NEXT P
2099 GOTO CRSR
2120 DATA 104,160,1,177,203,136,145,20
3,196,205,200,200,144,245,198,203,96,1
04,164,205,177,203,200,145,203
2130 DATA 136,136,16,247,230,203,96
2140 DATA 104,160,1,177,206,136,145,20
6,196,208,200,200,144,245,198,206,96,1
04,164,208,177,206,200,145,206
2150 DATA 136,136,16,247,230,206,96
2200 DATA 0,129,66,36,24,36,66,129,0
2210 DATA 0,16,16,16,254,16,16,16,0
```

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THE WITNESS:
WHODUNIT?

by Mark S. Murley

11:37 p.m. Thirty-fourth Street and Steeler Avenue. The heat hangs low and close over the alleyways of the hopeless. A tortured cat mewls in the distance. The street lamps throw stark pools of light onto the curb and gutter.

The trail ends here at a flophouse on Steeler. Biscuit City it ain't, but let me tell you something, Bud: After two months of scratching for clues in every armpit and hovel in the city, Mecca couldn't look any better to a Moslem. I draw a smoke from a pack, fire it and survey the scene.

Leaning against a metal lamppost, I feel its cool sting knifing through my jacket. Tepid sweat runs down my temples. The view from here is good, but as I stare up towards a darkened, two-story window, I figure that works both ways. I move off toward the shadows.

The smell of the flophouse assaults me from the doorway like a kick from a wino's foot. The door handle, worn smooth from years of use, opens onto Squalor with a capital "S." That's the way Stiles might've said it.

Inside, the stairwell conforms to the rest of this oversized, "handyman's special" (as those well-oiled realtors put it). The steps sway and groan loudly with each footfall.

On the second floor a half-dozen doors open onto a pea-green hallway. Muffled voices seep through the thin walls. Somewhere a radio is playing. Leaning against the wall, I can hear the paint curl.

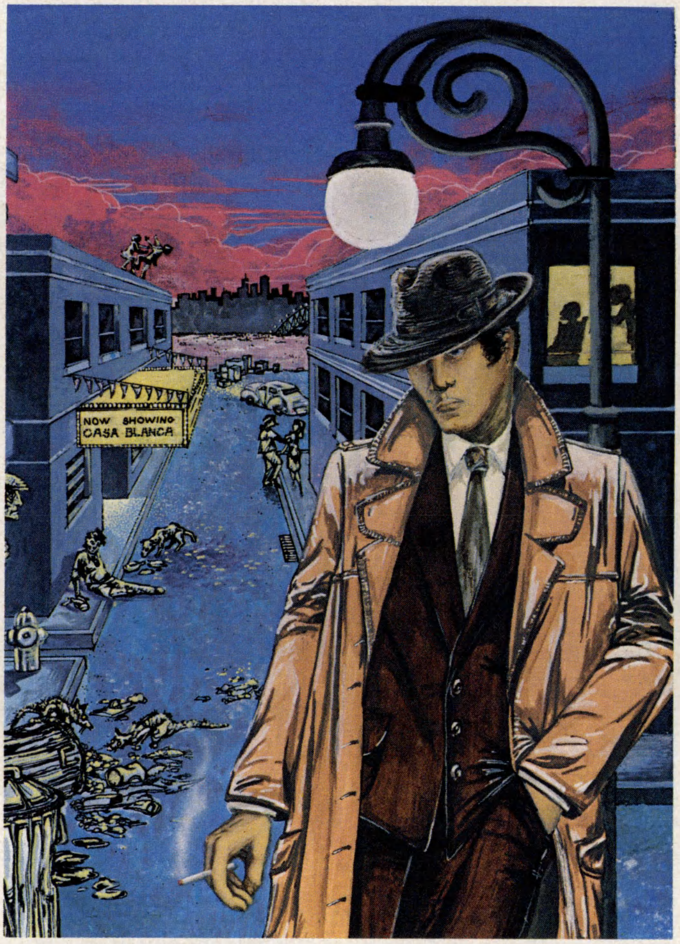
The third door on the left: Room 207. No voices, no music come from within. No light leaks from under the doorjamb. The lock submits quickly to the pick, and with a single quick motion, I step inside, revolver leveled and sweeping for action.

Mark S. Murley writes documentation and ad copy for Adventure International. Among his credits are the sagas of Wadsworth Overcash in Russ Wetmore's PREPPIE *series!*

The room is sparely furnished: a small icebox, an unmade bed beside a nightstand, some clothes draped over a chair, an ashtray overflowing with a month's worth of butts. Not much of a housekeeper. On the kitchen table rests the payoff: an Atari 800, its CRT peering into the half-light. I lower the gun, holster it, and pull up a chair to the table.

A manilla police file is propped against the Atari. Opening it I shake the contents onto the table. Everything's here, everything but the sweat that is. The next 12 hours will tell the tale...

Straight from the pages of the 10-cent pulps of the '30s and '40s comes Infocom's *The Witness*, an interactive whodunit adventure that echoes the format and flavor of the Cambridge-based company's phenomenally successful *Deadline*. And like its predecessor, the motif is once again murder most foul.



Here's the lowdown. It's February, 1938. Virginia Clayton Linder, a "gilt-edged society dame" has turned up face down. As the chief police detective for a small California town, it's up to the player to ferret out enough evidence for an arrest. And there's no shortage of suspects in a rogue's gallery of colorful, supporting characters that would cause even Hercule Poirot to cringe.

The challenge is intensified by a rigid time limitation: You have 12 game-time hours and not a minute more to crack the case. And, as you might suspect, you'll need every precious second.

You enter commands in simple English, for example, "Arrest The Suspect," "Fire The Gun," and so on. Unlike many adventure games, The Witness accepts complex sentences entered on a single input line, provided that the conjunction "then" is used or a period is added. Thus, to save time, a player may enter "Arrest The Suspect Then Fire The Gun."

But why save time, you might ask? Ah, there's the rub. Each time you enter a response, the game time advances. Some investigative actions take about a minute, while others, such as the command Wait, can cause 15 minutes of game time to roll by.

Once sufficient evidence is accumulated for a bust, the venerable Sergeant Duffy will assist you in putting the accused into the slammer. But bear in mind that "sufficient" evidence requires that you establish three major elements: motive, method, and a reasonable opportunity for the accused to have committed the crime.

Following the arrest, you will receive, via your Atari, a letter from your superiors regarding the outcome of the grand-jury investigation. If the D.A. follows through with an indictment, you win the game. If not, your superiors will probably fill you in on where you went wrong, and you try again.

Here's the letter received after the lover of Virginia Linder, Stiles, was accused of the murder and placed under arrest.

Text of a letter from Police Chief Klutz dated February 28:

Dear Detective:

According to your report and deposition, the only question in this case is who shot Mr. Linder through the window of his office. However, I believe that the real story is not so simple.

But, despite my reservations, the trial jury did convict Mr. Stiles of the murder. Through plea-bargaining, his sentence was reduced from execution to twenty years.

Post script: A few months later, after you are transferred to another department, you get a memo from your former boss. It says that new evidence was discovered in the Linder case, causing the court to reverse Stiles' conviction and set him free. Let's hope he doesn't come around bent on revenge!

Clearly, receipt of such a letter at game's end is undesireable, and indicates either slipshod or incomplete investigative work on the part of the player. Waiting for the letter of confirmation is half the fun though, and an exciting climax to what usually amounts to be a very lengthy game.

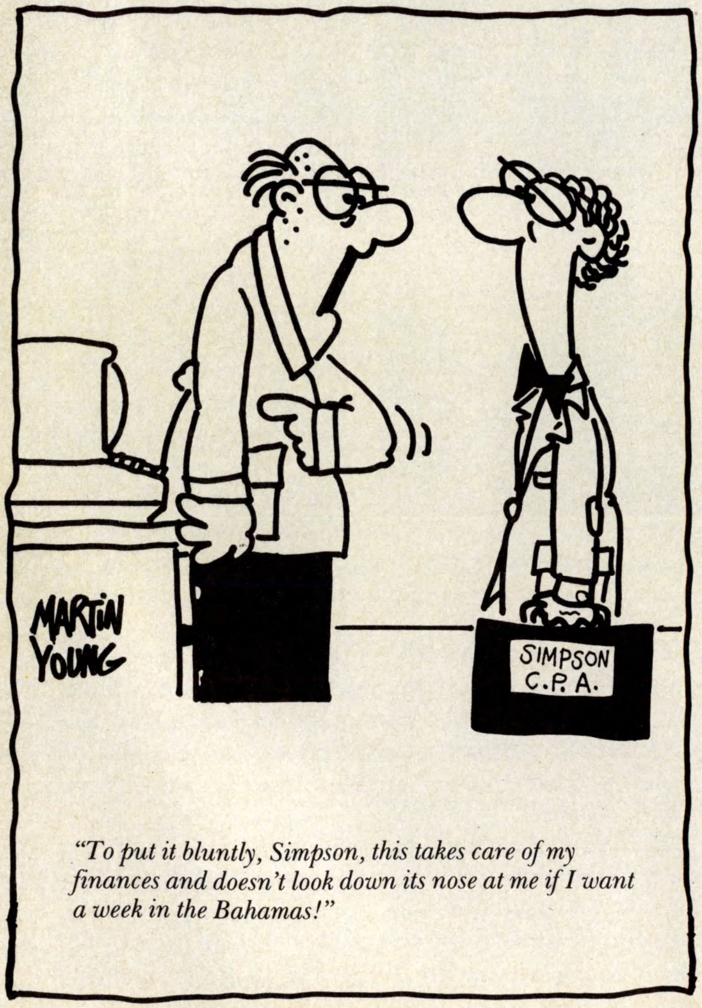
Through its meticulous attention to detail and thick slabs of prose that advance the plot, *The Witness* immerses you in its cavernous storyline. The following is an example of these elements from early in the story.

"You are now in the living room. A fieldstone fire-place on the south wall holds a blazing fire, filling the living room with warmth and light. Grouped in front of the fire are a glass-topped coffee table and a rattan davenport and club chair, with cushions covered in a print showing bamboo plants in the style of a Japanese brush-painting. A lamp with printed shade and a telephone sit on the table. On the north wall are a console radio and a liquor cabinet made of light-colored wood. A single door in the east wall is closed, and at the west end of the room is a double door."

Considering that most, if not all, of the objects in the preceding paragraph can be individually examined, and that this is but one of many "rooms" in the game, you can readily see that your 12-hour time limit will not be idly whiled away!

The "human" factor is quite important throughout the course of play. Each of the many characters in *The Witness* has his or her own unique characteristics, and the prudent armchair dick is well advised to take full advantage of this fact. Calling someone by his or her name is important, too. If you wish to ask Mrs. Jones the last time she saw Mr. Stiles, "Mrs. Jones, when did you last see Mr. Stiles?" is much preferred over an interrogative that does not include her name.

Similarly, one would probably not wish to apply a "Mrs. Jones" to the Linder's Oriental housekeeper, Mr. Phong, who "carries his stout body lightly" and whose imposing musculature is apparently evident despite his loose-fitting apparel.



"To put it bluntly, Simpson, this takes care of my finances and doesn't look down its nose at me if I want a week in the Bahamas!"

Much of *The Witness* accepts the typical adventure-game nomenclature. If you wish to move west, for instance, you can type "Walk West" or simply "W." A list of 52 important commands is supplied with the program, although the game's vocabulary is much larger.

As with most products, software or otherwise, the consumer's first impression usually derives from the product's packaging. Infocom is well-known for its truly innovative packaging as anyone who has examined *Deadline*, *Star Cross*, or *Suspended* will attest. *The Witness* falls a tad short of the complexity of the elaborate *Deadline* mishmash of physical evidence and printed matter, but it is nonetheless lavish and detailed.

The Witness package resembles an actual police file when it's removed from its slipcase. Inside the file is a plethora of documents and a couple of pieces of physical evidence. The material includes:

The Detective Gazette — a slick, 8-page replica of a detective magazine, replete with authentic period ads for fingerprint kits, police badges and handcuffs. This cleverly designed booklet is actually the program documentation.

The Register — a full-sized, two-page reproduction of Santa Ana's "official" newspaper.

A page of Virginia Clayton Linder's stationery — the handwritten suicide note that instructs the late Mrs. Linder's daughter to pass a caustic farewell along to Mrs. Linder's two-timing husband: "Tell your illustrious father how deeply I regret soiling one of his precious revolvers."

A Western Union Telegram — from Freeman Linder to PMS Chief Detective.

A book of matches from The Brass Lantern restaurant.

Several additional features of *The Witness* include game save, a running account of hours and minutes (game time), and a nearly indispensable script feature that allows a transcript of the game to be printed as the game is played.

The Witness is, by virtue of its complexity, superior to the bulk of adventure fare that has glutted the market for the past three or four years. Don't look for graphics, however. *The Witness* is an all-text format. This, along with a special data retrieval process allows the program to access over 100K of information. To put it another way, the amount of text in *The Witness* approaches novella length.

The Witness is the brainchild of Infocom's Stuart Galley. He spent about nine months researching and developing *The Witness*. He says, "The program was designed not so much as a sequel, but as a complement to *Deadline*."

The Witness offers documentation that is inventive, apparently error-free and concise. *The Register* and other accompanying paraphernalia give a solid feel to the package, legitimizing the steepish $49.95 price tag. The game itself, in spite of its complexity is extremely user-friendly, and often quite humorous. Infocom cut no corners in the design or — if you'll pardon the pun — execution of *The Witness*, and it shows. A hearty round of kudos to Stuart Galley and Infocom for an admirable effort. *The Witness* is a killer.

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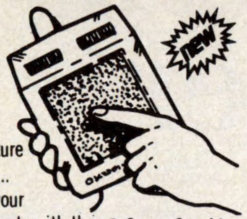

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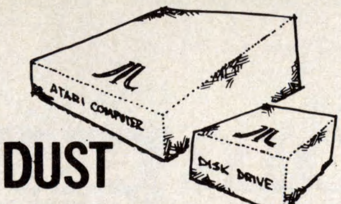

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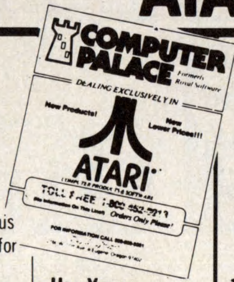

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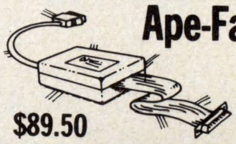

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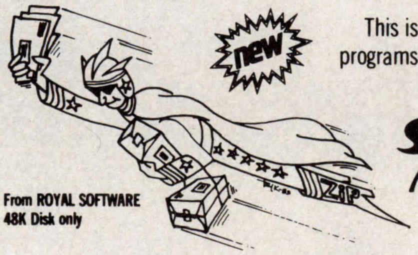

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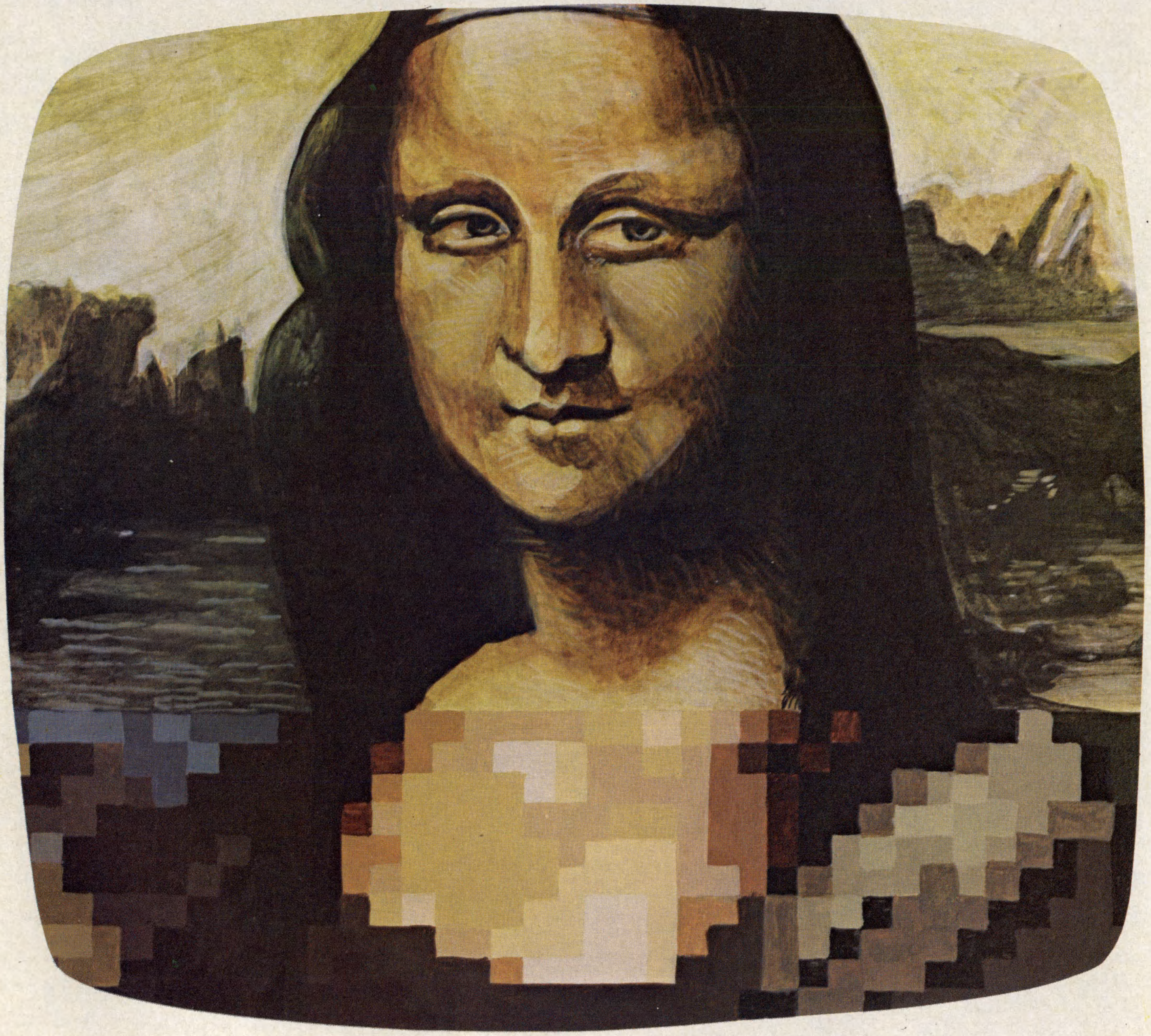


by Pam Sexton

We've all been told that a painting is best viewed from a distance, but to understand the finer details of an artist's technique requires a closer scrutiny. Some "Old Masters" are even studied using magnifying lenses.

If your interest in television graphics is purely for enjoyment, you can sit back and appreciate its color and design. If, however, you'd like to understand the graphics display, you'll have to move closer to the screen. This series of articles will take you closer to the screen.

First, let me introduce you to some vocabulary that is fundamental to graphics and microprocessors in general.

Pixel. Imagine your monitor is overlaid with a sheet of graph paper designed to fit exactly on the screen. We are interested in the little squares that fit together to create the paper. Each one of these squares is a pixel.

Binary. Anything binary consists of only two parts. In a binary world, we see only black and white. Statements are true or false. Inside a microprocessor are two conditions: on or off. A zero (0) indicates an off condition; one (1) indicates an on condition. The microprocessor is a binary world of 0's and 1's.

Bit. A contraction of "binary digit." A bit is either a zero or a one.

Byte. Humor does exist in computerese. Take a handful of bits—0's and 1's—until you have hold of eight of them. Line them up in any pattern you choose. You then have a byte, a group of eight digits.

Register. An area reserved in a computer to hold a designated value. For example, a color register is used in the Atari 800 to hold a value that represents a certain color.

Character. An image that is defined by turning "on" or turning "off" pixels in a pattern within an eight-block wide by eight-block deep square or "matrix." (Eight digits across equals one byte; each matrix is eight *bytes* deep.) For example, the letter A and the image of a starship are formed as follows:

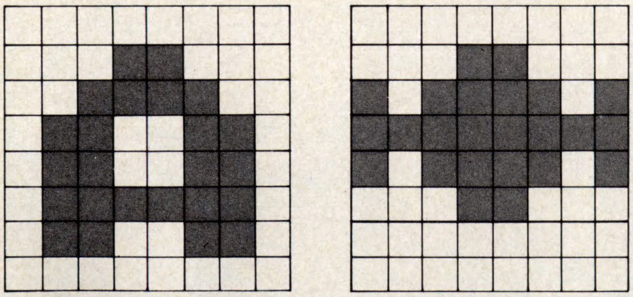


Fig. 1. 8x8 Matrix pattern of the letter "A" (left) and Starship image (right).

The Atari Character Set

The operating system within the Atari 800 supplies a standard character set. These are the familiar keyboard images: alphabetical characters and special-purpose characters such as the dollar sign ($) and equal sign (=). The full character set contains 128 characters. But, as a computer graphics artist, you are not "locked" into this character set. You have the option of creating up to 128 of your own unique graphics patterns and replacing the standard character set. To do this you must use that portion of memory reserved by the operating system for its alphabetical characters.

To use the Atari character graphics you must:

- Define the character set
- Convert the graphics images into computer data
- Display the image onto the television screen.

As expressed previously, a character consists of pixels placed in a pattern on an 8x8 matrix. With this restriction, you may initially feel that your artistic attempts are somewhat confined. Not to worry. Begin with a large sheet of graph paper dimensioned in some multiple of eight, for example, 32 x 32 squares or 512 x 64 squares. Sketch an appealing image on the paper. After you have finished your drawing, divide the paper into 8 x 8 squares.

To demonstrate, I'll be a little less industrious and use a sheet of graph paper dimensioned to 48 x 32. That gives us 24 possible characters (See Fig.2).

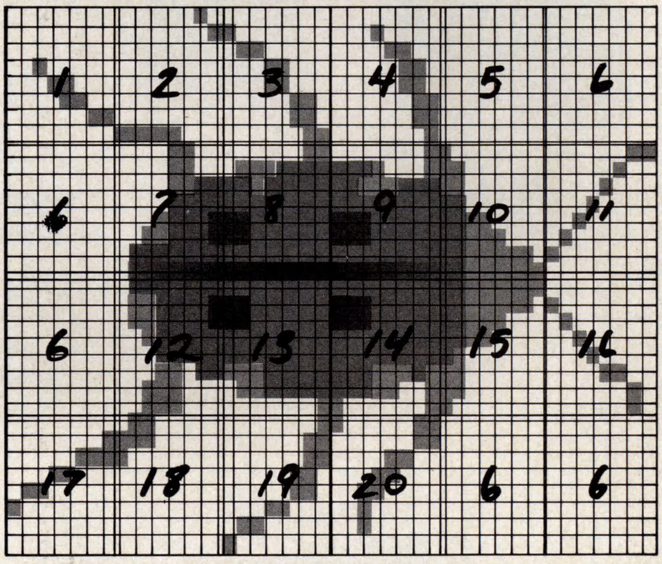
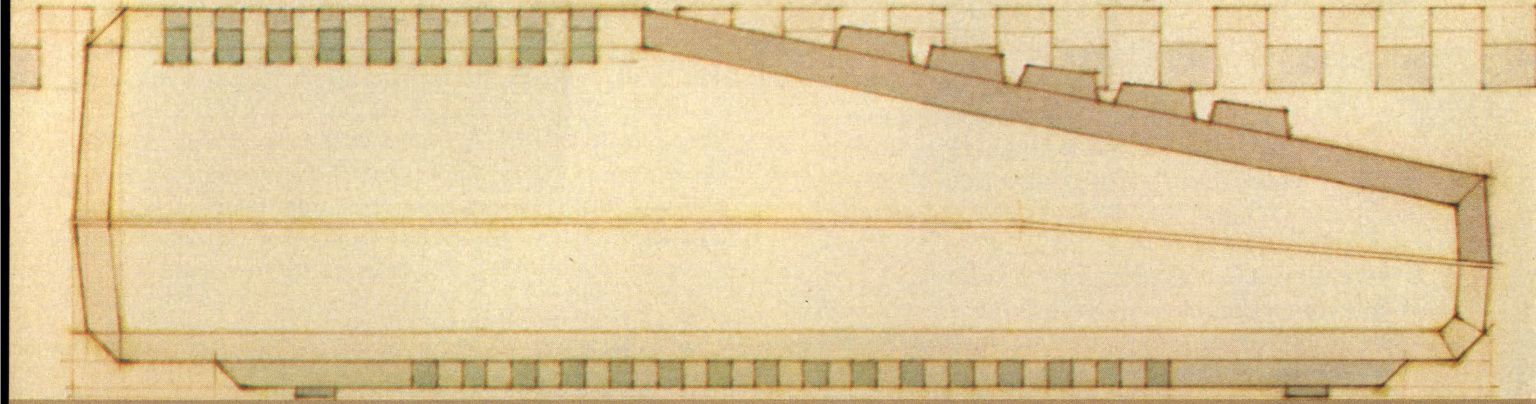
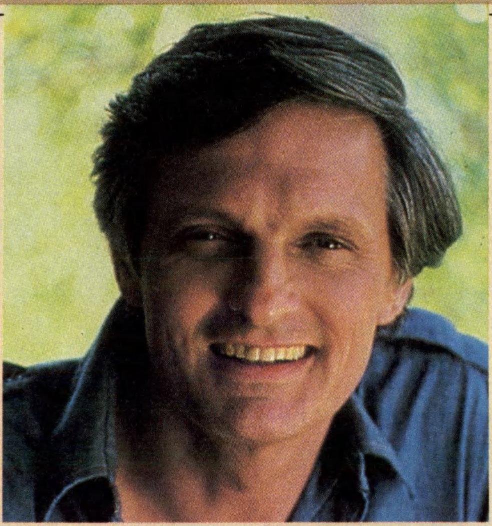


Fig. 2. Black and white character set graphic of a beetle bug.

Remember our discussion of a binary world where everything is either black or white, on or off? Take a look at each square of the drawing. Whenever you encounter a square that is to be colored, assign it the value 1. And, likewise, whenever you run across a square to be left blank, assign it the value 0. Encoding the first 8 x 8 block in Fig.2, produces the following result.

```
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
0 0 1 0 0 0 0 0
0 0 0 1 1 0 0 0
0 0 0 0 1 1 0 0
0 0 0 0 0 0 1 1
0 0 0 0 0 0 0 0
```





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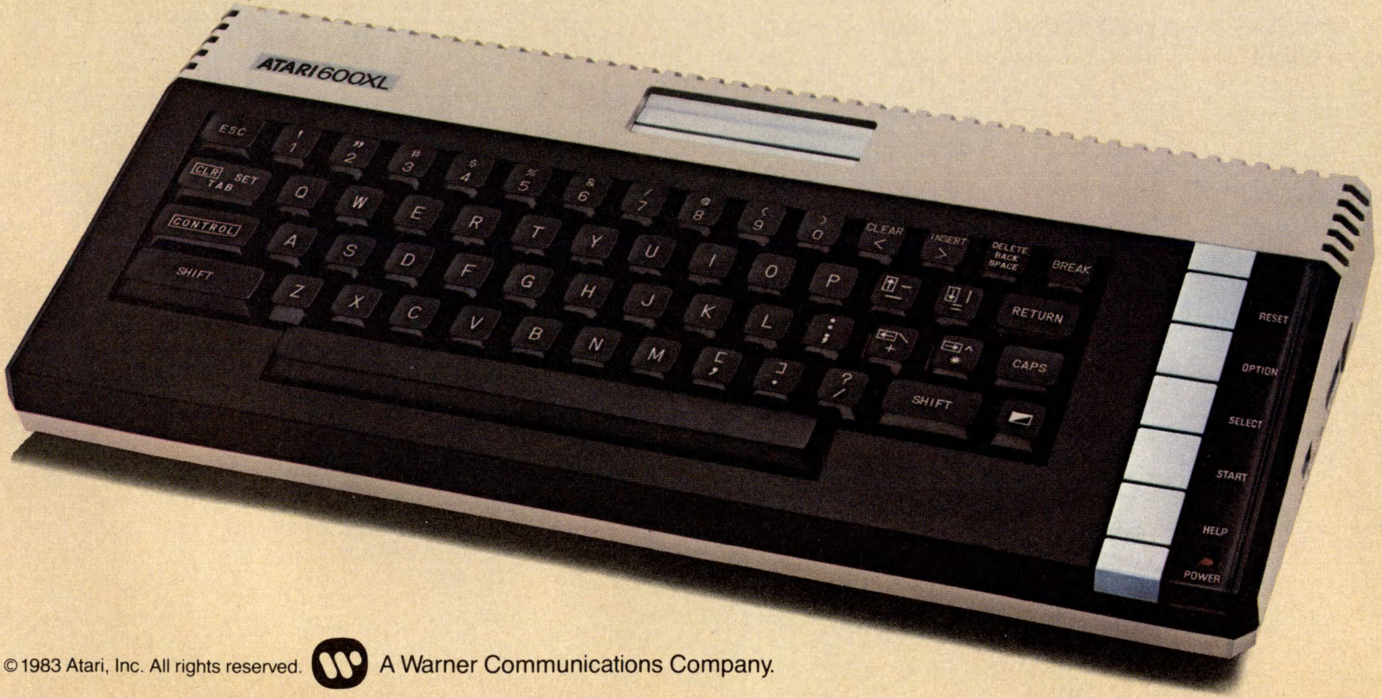
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Adding Color to the Beetle

Let's interrupt our discussion momentarily to introduce another element. This black and white environment is less than pleasing. By adding one more color, say a red-orange, you can transform the ominous-looking beetle in Fig. 2 into a more glamorous ladybug. But, how can you do this if you're restricted to a binary system?

It's time to fine-tune our character definition. A character is an image defined by lighting pixels in a pattern within an 8-bit by 8-byte matrix. When dealing with a two-color image, a single bit can define the color for a pixel. Therefore, the width of a character is eight pixels. However, when you are dealing with more than a two-color image, you must use a two-bit combination to define the color for a specific pixel. And so, the maximum character is now limited to a four-pixel (four-block) width.

Using Atari Basic you can assign colors to any of four color registers. You access the color as you need it by referring to the register that contains the color value. This process is known as "indirection."

Think of these registers as an artist's palette, and imagine the Basic program statement as the artist's brush. Every time the artist dips his brush into the color in the upper left corner of the palette, that color ultimately appears on the canvas. If the artist dips his brush into the color in the lower right corner of the palette, then that color appears on the canvas.

Imagine that an artist's palette can hold only four containers of color at once. He now has to hire an assistant who will run around and exchange containers to provide the artist with more colors. In the Atari this artist's assistant is our Basic Setcolor statement. The Setcolor statement calls a color from the appropriate registers. The color registers in the Atari are labeled Playfield 0 through Playfield 3 and Background. Basic can access only four of the registers at any one time.

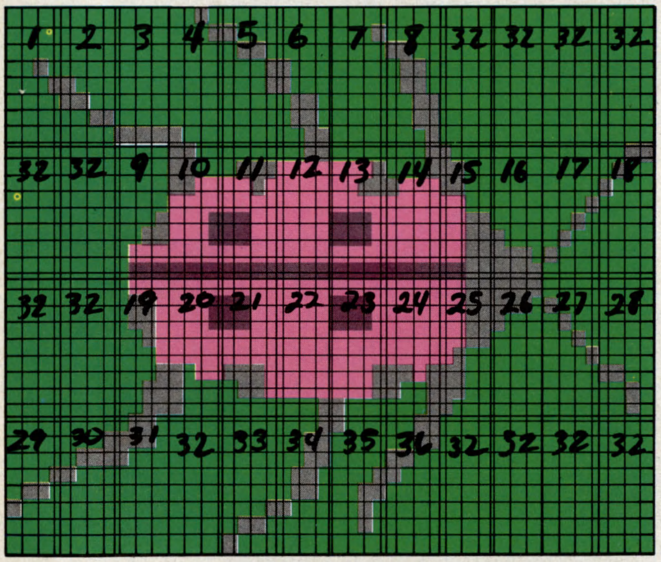

Fig. 3. Three-color character set graphic of a ladybug.

The Atari operating system assigns a specific combination of bits, a bit pattern, to indicate a particular color register.

Returning to our example, let's place black in Playfield 0 and use this register to color in the legs and antenna. And let's place green in Playfield 1 and use this as an outline color for our graphic display. Finally, let's place a red-orange in Playfield 2 to transform our ladybug. Using the bit-pattern in Table 1, our drawing now looks like Fig.3.

Bit Pattern	Register	
00	COLBK	Background color
01	PF0	Playfield 0
10	PF1	Playfield 1
11	PF2	Playfield 2

Table 1. Bit Pattern to Register Assignments

Let's code Character Number 11 in Fig.3.

```
10 10 10 10
10 01 01 01
11 11 01 11
11 11 11 11
01 01 11 11
01 01 11 11
11 11 11 11
01 01 01 01
```

Fig.4. shows the three-color pattern for character number 11.

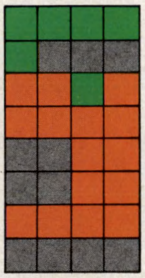

Fig. 4. Character Number 11 from the colored ladybug.

Binary Conversion

Because Basic requires decimal data, you must now convert the binary pattern into decimal equivalency. The eight binary digits of any byte correspond to an exponential power of 2.

The rightmost bit of any byte sits in the 2 to the 0 power position, and the leftmost bit lies in the 2 to the 7th power position (Fig.5).

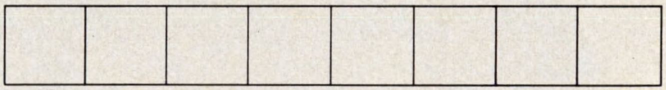

Fig. 5. Binary to decimal conversion of an eight-digit byte.

$2^0=1$
$2^1=2$
$2^2=4$
$2^3=8$

$2^4=16$
$2^5=32$
$2^6=64$
$2^7=128$

To convert the binary pattern of 0's and 1's to decimal means that you add the powers of two in those positions containing a one and disregard any position of zero value. So, the first byte in Character Number 11

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looks like Fig.6.

1	0	1	0	1	0	1	0
1		1		1		1	
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0

128 + 38 + 8 + 2 = 170

Fig 6. The appropriate power of two is added where the digit one is in position.

And the second byte equals 149 (Fig.7).

Continue to obtain the decimal equivalents for all your characters. To complete the example, the remaining bytes are 247, 255, 95, 95, 255, 85. This is the most time-consuming task related to character design.

1	0	0	1	0	1	0	1
1			1		1		1
2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0

128 + 16 + 4 + 1 = 149

Fig. 7. The second byte in Character Number 11 equals 149 decimal.

Displaying the Image

By entering Program Listing 1 you can display the example ladybug graphic. Several elements enter into this program:

- Choice of colors
- Position of the display
- Sequence of characters
- Display list instructions
- Choice of graphics mode
- Position of the data in computer memory

In the next article, I will go into the detail of Program Listing 1 and provide you with enough information so that you can display your own character graphics. Meanwhile, I invite you to work on your character set, and prepare for programming and animation!

NOTE: Line 1 of Program Listing 1 is created as follows: ?"[ESC][CTRL.DOWN ARROW] [ESC][CRTL.DOWN ARROW] [ESC][CTRL.DOWN ARROW] [ESC][CTRL.DOWN ARROW] [ESC][CTRL.DOWN ARROW]" The purpose of this line is to move the cursor below the ladybug so that it will not interfere with the graphic. The CTRL and Down Arrow keys are together in brackets to signify that they should be pushed simultaneously.

Artist & the Computer

```
1 PRINT CHR$(125);CHR$(29);CHR$(29);CH
R$(29);CHR$(29)
2 SETCOLOR 0,0,0
3 SETCOLOR 1,12,10
4 SETCOLOR 2,3,2
10 FOR X=0 TO ((8*37)-1):READ Y:POKE 1
6384+X,Y:NEXT X
20 DATA 0,0,0,0,0,0,0,0
21 DATA 170,170,170,166,169,170,170,17
0
22 DATA 170,170,170,170,106,90,165,170
23 DATA 170,170,170,170,170,170,170,85
24 DATA 166,169,170,170,170,170,170,10
6
25 DATA 170,106,150,169,169,170,170,17
0
26 DATA 170,170,170,106,106,150,150,16
5
27 DATA 170,169,170,170,170,170,170,17
0
28 DATA 170,170,90,150,150,165,165,169
29 DATA 170,170,170,170,169,165,191,14
9
30 DATA 90,90,95,255,253,253,255,85
31 DATA 170,149,247,255,95,95,255,85
32 DATA 165,255,255,255,255,255,255,85
33 DATA 170,253,245,255,87,87,255,85
34 DATA 169,169,127,255,255,255,255,85
35 DATA 106,90,90,250,245,245,245,85
36 DATA 170,170,170,170,170,106,86,85
37 DATA 170,170,170,169,166,154,106,17
0
38 DATA 165,154,106,170,170,170,170,17
0
39 DATA 191,151,151,167,171,169,165,16
5
40 DATA 255,253,253,255,255,111,106,10
6
41 DATA 255,95,95,255,255,87,151,170
42 DATA 255,255,255,255,255,255,255,16
9
43 DATA 255,87,87,255,255,253,253,106
44 DATA 255,255,255,255,255,93,105,169
45 DATA 245,245,245,245,218,90,90,106
46 DATA 85,86,106,170,170,170,170,170
47 DATA 170,106,154,166,169,170,170,17
0
48 DATA 170,170,170,170,170,90,166,166
49 DATA 170,170,170,169,150,106,170,17
0
50 DATA 170,169,149,106,170,170,170,17
0
51 DATA 150,86,106,170,170,170,170,170
52 DATA 170,170,170,170,170,170,170,17
0
53 DATA 170,170,170,170,170,169,150,10
6
54 DATA 169,165,165,150,150,106,170,17
0
55 DATA 106,170,170,169,165,166,166,17
0
56 DATA 165,165,90,106,170,170,170,170
57 CHBAS=756
60 POKE CHBAS,64
61 I=PEEK(560)+PEEK(561)*256+6
62 FOR X=0 TO 3:POKE I+X,5:NEXT X
70 I=PEEK(88)+PEEK(89)*256+40
75 FOR Z=0 TO 3
90 FOR X=1 TO 12:READ Y
95 POKE I+Z*40+X,Y:NEXT X
96 NEXT Z
100 DATA 1,2,3,4,5,6,7,8,32,32,32,32
101 DATA 32,32,9,10,11,12,13,14,15,16,
17,18
102 DATA 32,32,19,20,21,22,23,24,25,26
,27,28
103 DATA 29,30,31,32,33,34,35,36,32,32
,32,32
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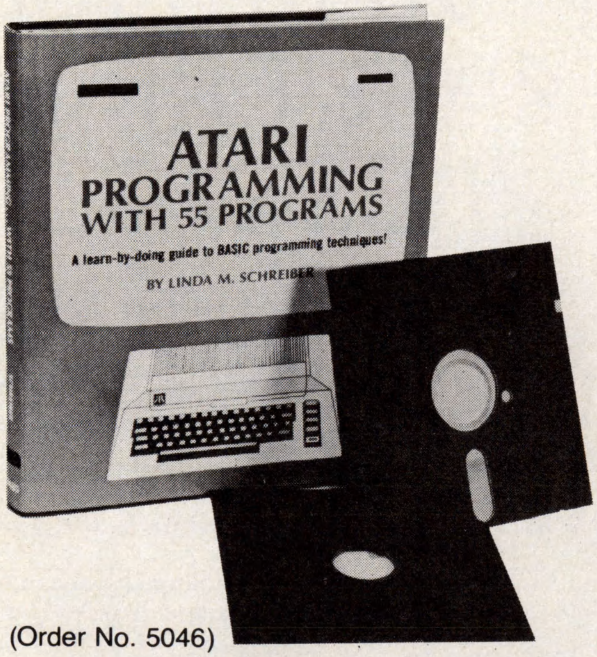

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HIRS 185

OH, THOSE ?$*& ERROR MESSAGES

LAST OF A SERIES

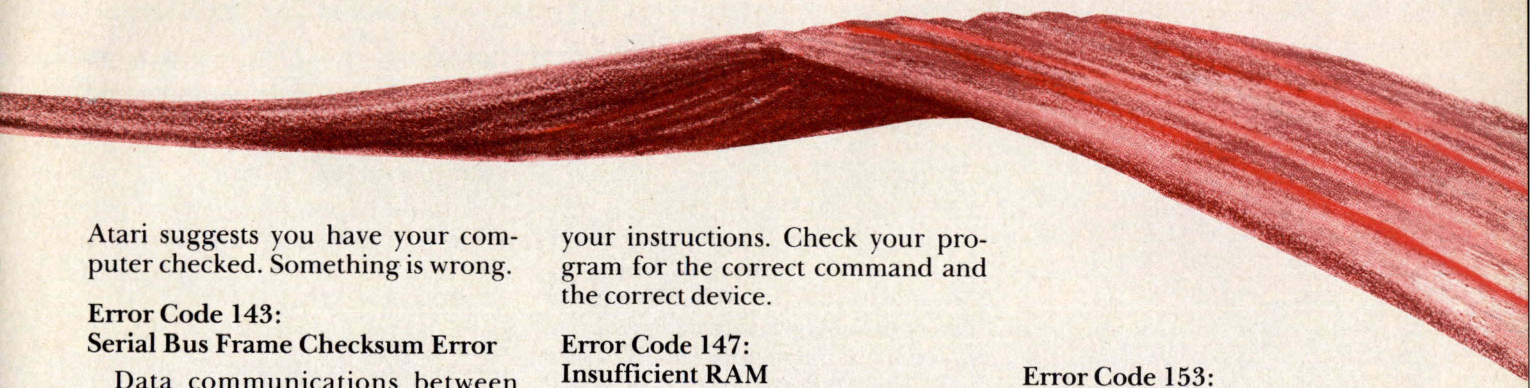
BY STEVE HARDING

Welcome, computer pals, to part 3 of our series on the Atari BASIC Error Messages.

If there is terminology used in this month's installment, I refer you to the first two parts of the series. I have also used De Re Atari, the Atari BASIC Reference Manual, the Atari Disk Operating Reference Manual and the Atari 850 Technical Manual as reference. Having copies of these books in your library will be helpful in understanding the material I'm covering.

Error Code 142:
Serial Bus Frame Data Overrun

If this error continually happens,



Atari suggests you have your computer checked. Something is wrong.

**Error Code 143:
Serial Bus Frame Checksum Error**

Data communications between your computer and a peripheral device have become garbled. The error could be generated by your software or by your computer or a peripheral device. If it is a recurring error, carefully check your program. If the software seems correct, then perhaps there is something wrong (heaven forbid) with your computer or the peripheral device.

**Error Code 144:
Device Done Error**

I probably have had more problems with this error than any other. In my case, it means the disk I am trying to extract data has decided to take a hike. Or, it can mean the disk drive has taken a hike and cannot extract the data.

If it is the latter, the usual cause is a change in the disk motor RPM. There is one more thing that can generate this error. Fortunately, it is not serious. You have tried to write data to a disk that has a write-protect tab in place. Remove the tab and all should be well.

**Error Code 145:
Read After Write Compare Error**

This error is generated by the Screen Editor. You've tried an illegal Graphics Mode. Specifically, 12, 13, 14, or 15. And ... you are using a 400 or 800 home computer. No, I'm not psychic. The XL computers have additional graphics capabilities.

**Error Code 146:
Function Not Implemented**

You are trying to implement a function your computer knows nothing about. Usually, it means attempting to do something like trying to PUT data to the keyboard.

Technically speaking, the device handler does not know how to follow your instructions. Check your program for the correct command and the correct device.

**Error Code 147:
Insufficient RAM**

Your computer does not have enough memory to implement the Graphics Mode you have called. Try to squeeze your program into less memory. See De Re Atari for some helpful hints, or use a Graphics Mode that doesn't need as much memory.

Currently, there are no Error Codes 148 and 149. Error Codes 150 to 154 are Error Codes you can get when using the Atari 850 Interface Module. At present, no other Atari peripheral device will generate these errors.

**Error Code 150:
Port Already Open**

You attempted to OPEN one of the RS232 Serial Interface ports when it was already open through a different IOCB. You can access a single serial port through a single IOCB only.

**Error Code 151:
Concurrent Mode I/O Not Enabled**

You have tried to do Concurrent Mode I/O (XIO 40) without telling your 850 exactly what was planned. Check your program listing. Chances are you used an incorrect value when you opened the IOCB. Read up on Concurrent Mode I/O in the Atari 850 Interface Module Technical Manual.

**Error Code 152:
Illegal Buffer**

Atari, in its infinite wisdom, allows you to create your own buffer, rather than use the 40-character buffer in the Atari 850 Interface Module. If you don't supply the correct address of the buffer to your computer or the buffer length was not what the computer expected, you'll get this Error. See Section 9 — Starting Concurrent I/O in the Atari 850 Interface Module Technical Manual.

**Error Code 153:
Active Concurrent Mode I/O Error**

This can be a "fatal" error, causing your computer to "freeze" up. What has happened is you have opened Concurrent Mode I/O to one port of the 850 Interface Module and then attempted I/O to a different port. The 850 doesn't like that. Your computer isn't too happy, either. That's why it goes away. Sometimes pressing the SYSTEM RESET will correct it; most times it won't. Make sure that if you open IOCB #1 for Concurrent I/O you are sending your data to IOCB #1.

**Error Code 154:
Concurrent Mode I/O Not Active**

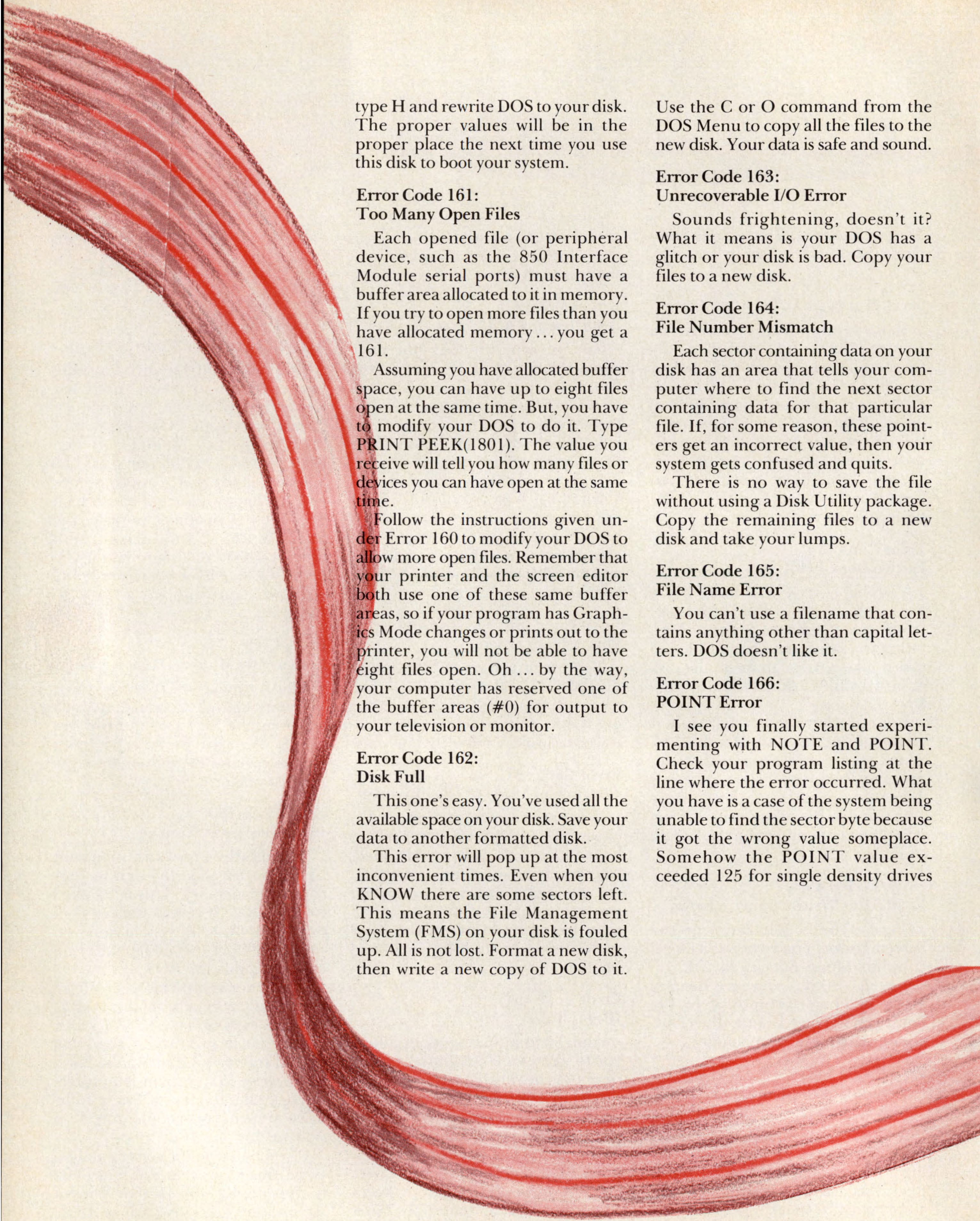
This is similar to Error Code 151. You must activate Concurrent Mode I/O using the XIO 40 command BEFORE you start performing input with either the BASIC GET or INPUT commands.

**Error Code 160:
Incorrect Drive Number**

Each disk drive on your system must have a buffer allocated to it in your computer memory. This is handled by your DOS. If you have more than one drive on your system and you continually get this error, then you have to modify the DOS.

This is not as difficult as it sounds. Boot your system with the BASIC cartridge in place. Type PRINT PEEK (1802). For a two-drive system you should receive a value of two. For a three-drive system you should receive a value of seven. For a four-drive system you should receive a value of 15.

If you don't get the corresponding value, don't worry. Here's how to fix it. Type POKE 1802,X. For X input the proper value. Now type DOS. When DOS Menu comes on screen,



type H and rewrite DOS to your disk. The proper values will be in the proper place the next time you use this disk to boot your system.

Error Code 161: Too Many Open Files

Each opened file (or peripheral device, such as the 850 Interface Module serial ports) must have a buffer area allocated to it in memory. If you try to open more files than you have allocated memory ... you get a 161.

Assuming you have allocated buffer space, you can have up to eight files open at the same time. But, you have to modify your DOS to do it. Type PRINT PEEK(1801). The value you receive will tell you how many files or devices you can have open at the same time.

Follow the instructions given under Error 160 to modify your DOS to allow more open files. Remember that your printer and the screen editor both use one of these same buffer areas, so if your program has Graphics Mode changes or prints out to the printer, you will not be able to have eight files open. Oh ... by the way, your computer has reserved one of the buffer areas (#0) for output to your television or monitor.

Error Code 162: Disk Full

This one's easy. You've used all the available space on your disk. Save your data to another formatted disk.

This error will pop up at the most inconvenient times. Even when you KNOW there are some sectors left. This means the File Management System (FMS) on your disk is fouled up. All is not lost. Format a new disk, then write a new copy of DOS to it. Use the C or O command from the DOS Menu to copy all the files to the new disk. Your data is safe and sound.

Error Code 163: Unrecoverable I/O Error

Sounds frightening, doesn't it? What it means is your DOS has a glitch or your disk is bad. Copy your files to a new disk.

Error Code 164: File Number Mismatch

Each sector containing data on your disk has an area that tells your computer where to find the next sector containing data for that particular file. If, for some reason, these pointers get an incorrect value, then your system gets confused and quits.

There is no way to save the file without using a Disk Utility package. Copy the remaining files to a new disk and take your lumps.

Error Code 165: File Name Error

You can't use a filename that contains anything other than capital letters. DOS doesn't like it.

Error Code 166: POINT Error

I see you finally started experimenting with NOTE and POINT. Check your program listing at the line where the error occurred. What you have is a case of the system being unable to find the sector byte because it got the wrong value someplace. Somehow the POINT value exceeded 125 for single density drives and 253 for double density drives.

Error Code 167:
File Locked

You've locked the file (either from DOS or using a XIO command) and now you're trying to do something to the file. You can't. Unlock the file and try again.

Error Code 168:
Device Command Invalid

There are three things that will cause this error. To explain this, let's create a file. Type this: OPEN #1,8,0,"D:TEST". Now type: END. Why? I told you the IOCB was open. You just closed it. TEST is now a valid file on your disk. It just contains no data and for our experiments, it doesn't need to.

Type: OPEN #1,4,0,"D:TEST". You have opened TEST for input into your computer. Next type: PUT #1,X. You have created a situation where you are trying to place data into a file that is opened for input only. Type: END.

Now type: OPEN #1,0,0,"D:TEST". You have opened the file, but the system doesn't know what you want to do with it. There must be a 4, 6, 8, 9, or 12 after the first comma of the command. Anything else confuses the issue.

The third thing that will create this error is an illegal XIO call. The Disk Operating System will not recognize any XIO call less than 32 or more than 38. Remember, I said DOS. See the Disk Operating System Reference Manual for more details.

Error Code 169:
Directory Full

There is limited space in the DOS Directory. You are allowed a maximum of 64 files per disk. You tried to save the 65th.

Error Code 170:
File Not Found

The file you are trying to access does not exist on that disk. Which means you have the wrong disk or you entered the filename incorrectly.

Error Code 171:
POINT Invalid

You have tried to use NOTE and POINT to get data from a file you have opened for output (from the computer to the disk). That's a no-no and consider yourself properly punished.

Error Code 172:
Illegal Append

There are now two versions of Atari DOS, DOS 1 and DOS 2.0. Using DOS 2.0, you cannot append a file to a DOS 1 file.

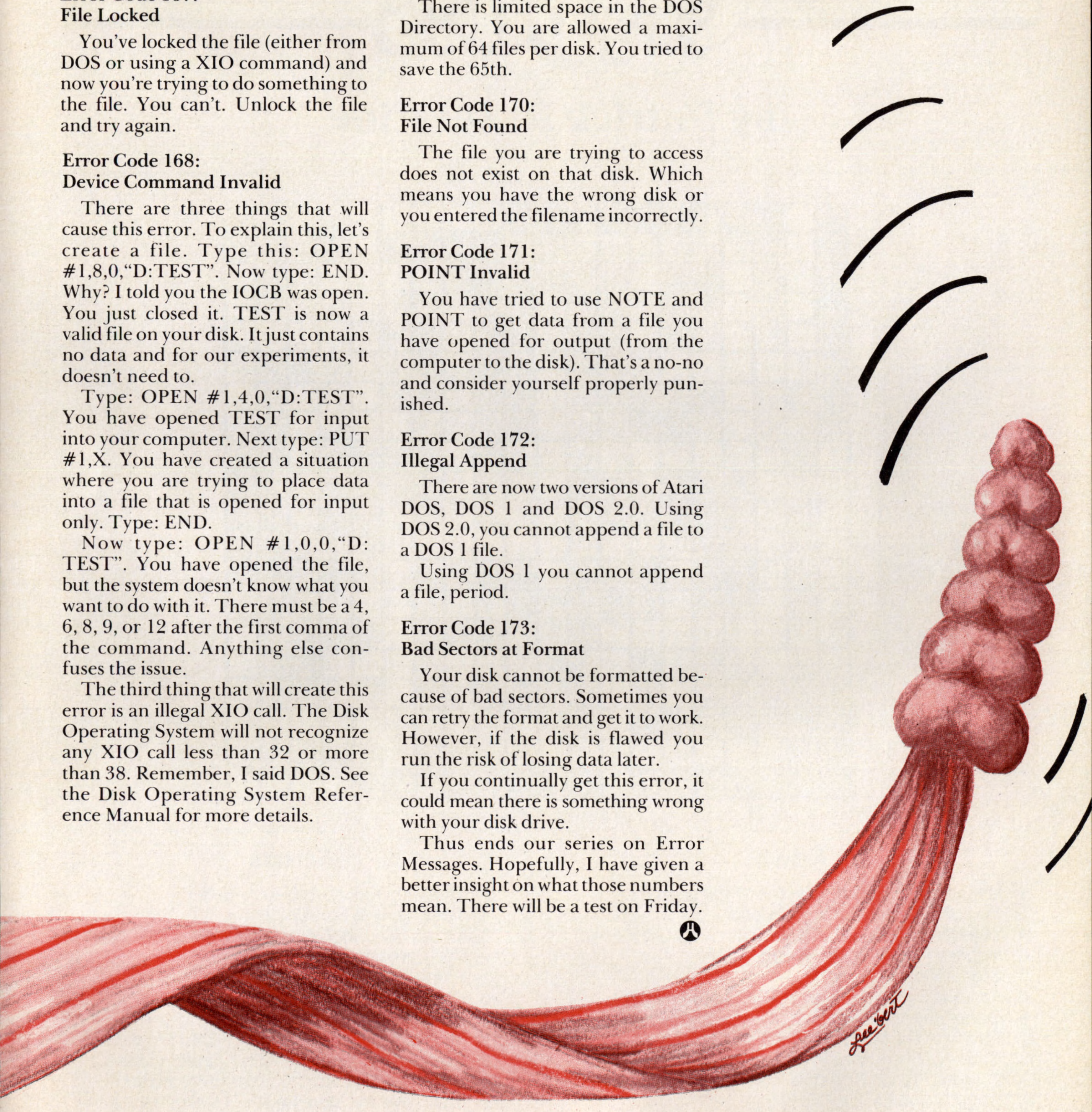
Using DOS 1 you cannot append a file, period.

Error Code 173:
Bad Sectors at Format

Your disk cannot be formatted because of bad sectors. Sometimes you can retry the format and get it to work. However, if the disk is flawed you run the risk of losing data later.

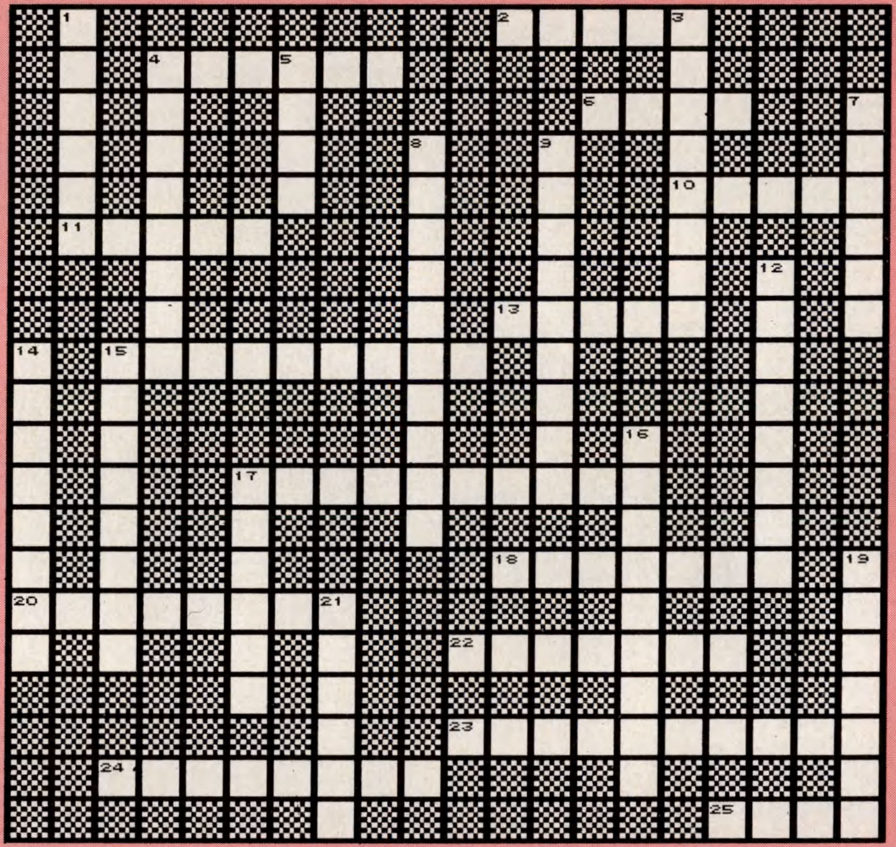
If you continually get this error, it could mean there is something wrong with your disk drive.

Thus ends our series on Error Messages. Hopefully, I have given a better insight on what those numbers mean. There will be a test on Friday.



Cryptics

by Patrick R. Serafine



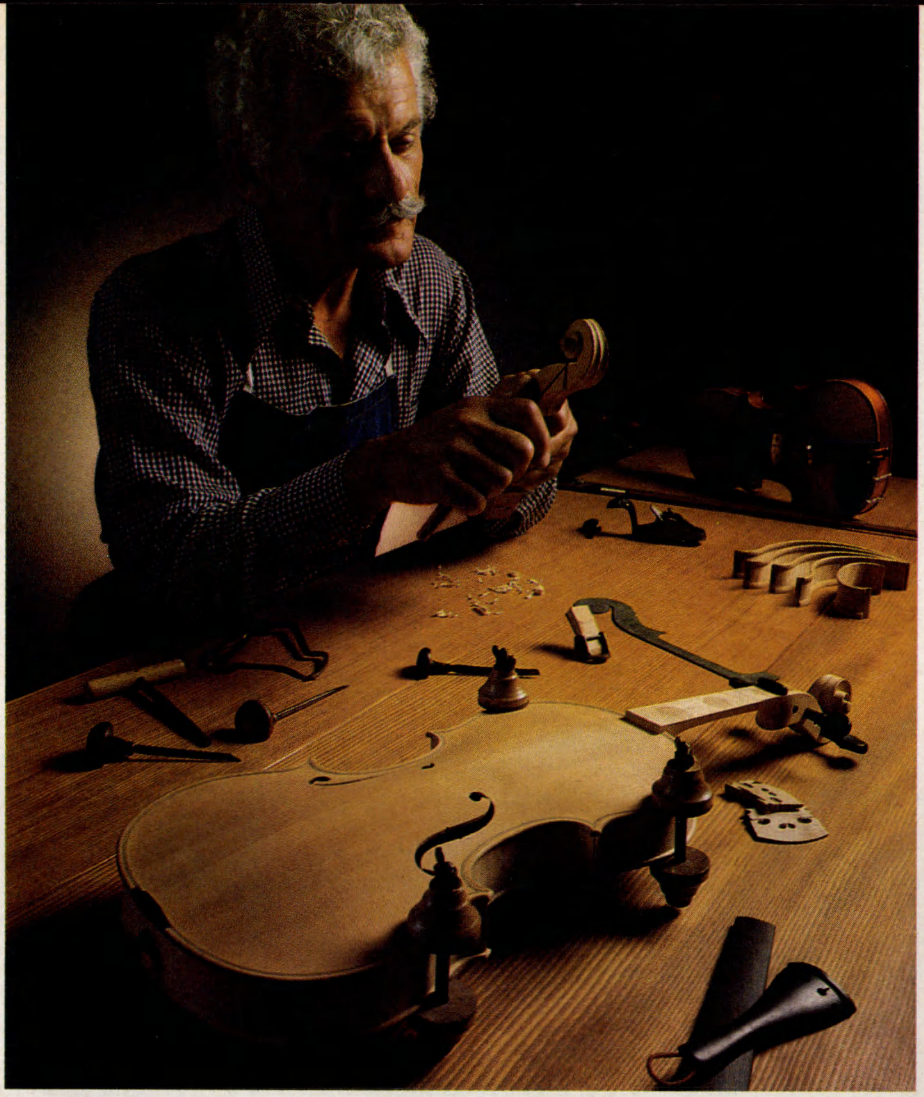
Down

1. Refueling Rockets In Caverns of Mars.
3. Pods Break Into These In Defender.
4. The Cavern World Of Zepellin.
5. Inspects Your Work In Hardhat Mack.
7. Star of Picnic Parandia.
8. Famous British Explorer In The Sands Of Egypt.
9. Opponents in Wallwar.
12. Raw Material Used In M.U.L.E.
14. Carriers Drop These In Bandits.
15. Famous French Detective In Murder On The Zinderneuf.
16. Preppie Overcash's First Name.
17. Miner 2049'er Bob's Nickname.
19. Screw-Shaped Creatures Which Shoot At You In Drelbs.
21. The Ultimate Enemy in Shamus.

Across

2. They Hop Around In Centipedes.
4. The Enemy In Star Raiders.
6. This Is Used To Distract The Wolves In Pooyan.
10. The Carpenter In Donkey Kong.
11. Follows You Around In Qix.
13. Characters In Juice.
15. The Enemy In Fort Apocalypse.
17. The Name Of The Famous Eastern Front Battle.
18. Creature From Archon With A Terrible Shriek.
20. Small Eye-Shaped Creatures In Marauder.
22. They Give You More Seeds In Necromancer.
23. Steals Your Compass And Map Maker In Wayout.
24. The Smartest Character In M.U.L.E.
25. "Blue Max" Chatsworth Fights For Them.

Crossword Answers, Page 81



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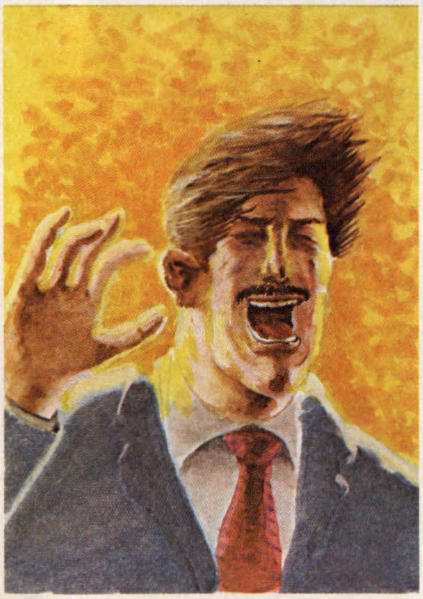
TRUEHART OF THE CIO

Episode I: The Perils of Pokey

by Léo G. Laporte

McGinty had been running down the long, hot corridors of the data bus for hours, and the exhaustion was beginning to show in his stride. Suddenly, he crumpled into a ball on the floor, the dying echo of his footsteps fading into the silence of the deserted hall. A second passed, then another. The low thrumming pulse of his pursuers' steps grew louder ... then fainter, as they turned off toward another part of the Mother Board in search of him. Finally, the hall was quiet, except for the sound of McGinty's racked breathing.



After a moment, he struggled to his feet. Warily, he began to walk down the hall. The Personality Board lay just ahead; in it were the offices of the CIO, and Jack Truehart. Truehart had to know; everything depended on it.

Step by step, McGinty grew closer, his sharkskin suit glowing an unearthly blue in the hall's dull light. All at once he stopped and sniffed the air. His nostrils flared with apprehension. Suddenly, a huge crackling red sphere of static electricity roared around the corner ahead.

"No!" the man shrieked, and turned to run, but before he could take a step, the field caught up with him and threw his body against the wall with bone-cracking violence. Pinned helplessly, he felt the sphere begin to squeeze the life out of him.

It was over in seconds. McGinty's body slumped lifelessly to the floor like an abandoned marionette. The killer sphere retreated down the pathway, its shimmering red form shrinking away to the size of a firefly's tiny glimmer, then disappearing altogether, leaving only McGinty's body and the acrid odor of ozone in the deathly stillness.

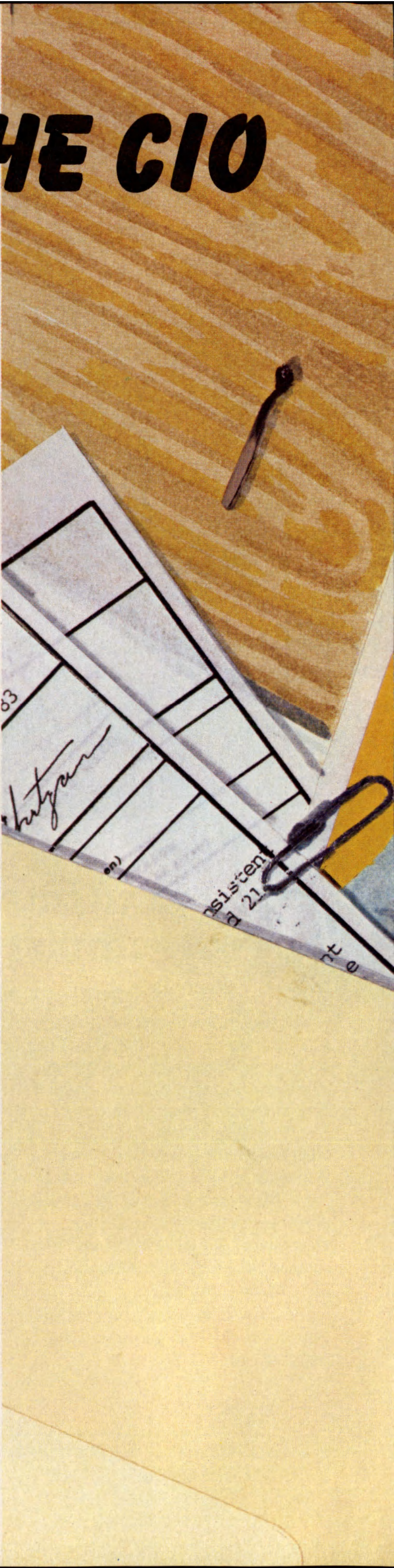
A short distance away, in the offices of the CIO, a single light burned in the darkness. Jack Truehart, the stubble of a two-day beard darkening his square chin, sat hunched over his desk. A large map lay spread before him, in his hand a red pencil.

"There's got to be a pattern here, Hube." With a quick sweep, he drew a line from one end of the map to the other. "Clock cycles missing here," he drew a circle. "Unauthorized disk accesses there." Another circle. "Someone else has been using the system. But who, and why?"

Hubert didn't answer. His 4-foot-tall form was leaning motionlessly against the stained couch across the room. He'd shut down his circuits for recharging hours ago, and was oblivious to anything but a direct command.

Jack grimaced, "I wonder where McGinty is. He should have checked in by now. I hope he didn't have any trouble with the POKEY people."

POKEY was a tough area in the northeast quadrant of the Mother Board. Jack had sent McGinty out to



JACK TRUEHART
DEC

talk to its inhabitants earlier in the day. He was due back at 5 o'clock. It was after midnight now.

Jack opened a drawer of the old oak desk and pulled out a bottle of Jack Daniels. "Drink, Hube?" He laughed to himself quietly, then poured himself a shot. "Guess it wouldn't do your circuits much good, old fella." He tossed it back quickly then grimaced. "Doesn't do much for my insides, either." He glanced over at the cartons of half-eaten Chinese food and shook his head.

"I think I'll go for a walk. Get some fresh air." He stepped through the office door, trotted down four dark flights of stairs, and made his way out the front entrance to the broad, slick surface of the data bus. By day, thousands of bits of data flew down the bus, eight at a time, but now, in the quiet of the evening, traffic had thinned to nothing. The charge of a few stray electrons gave the corridor an electric blue tint. Truehart tried to relax as he breathed the clean, cool night air. The click of his heels on the specially treated roadway sounded like keystrokes from the board above his head. As he walked he thought back to his meeting with OS two days before.

"Jack, we've got a problem."

"What is it, OS?"

"Take a look at these reports from SIO. Someone's been bypassing us. There's a clear pattern here of unauthorized use, mostly during the vertical-blank interval. Whoever's doing this is pretty cagey."

The vertical-blank interval was a break in processing that occurred every few thousand cycles. Everyone took a breather while the artisans in *ANTIC* touched up the screen display. The guys in 6502 appreciated the VBI. They worked pretty hard the rest of the time. But it looked like someone was taking advantage of this break time to do a little computing on his own. He wouldn't be able to get much done, but added up over a period of hours and days, who knows what could be accomplished?

That was what was worrying Jack when he stumbled across McGinty's body.

"Great arcing flip-flops! McGinty!" He rolled the cold bundle over. "What in the name of Grid are you doing here?"

Truehart pulled a thin plastic card from within his rumpled jacket. "Hubie, Hubie! Wake up. I've found McGinty."

"I'm already awake, Jack," came the robot's reply over the communicator, "I was just cleaning up the awful mess you left behind."

"Plenty of time to do that later, Hube. Didn't you hear me? I found McGinty!"

"Oh, that's nice."

Jack could hear the crumple and crackle as Hubert compacted and incinerated the Chinese food cartons. "Hubie, save the sweet and sour shrimp!"

"Too late, Jack. But you know it's no good for you. Why you eat this stuff is beyond me."

"Rats! Hube, just reboot McGinty for me, and hurry!"

"Right away, JT."

Jack could hear the beeping of McGinty's program loading. Seconds later the sharkskin covered bundle at his feet began to rise like an inflating balloon, and soon, a vacant, but relatively human face grinned at Jack and said, "Hi."

"McGinty. What happened?"

"Don't remember a thing, Jack."

"Blast."

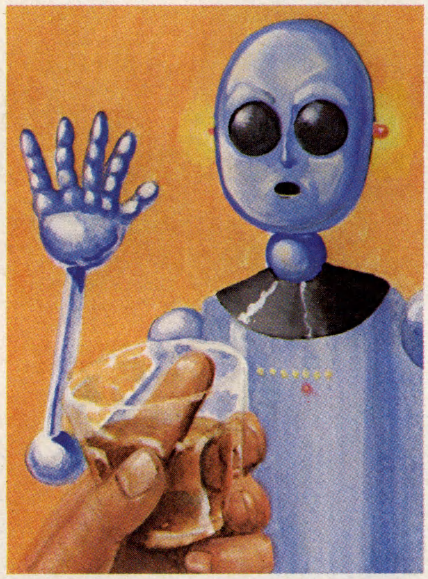
McGinty's circuits had been wiped clean as a blackboard on the first day of school. Questioning him about the POKEY people was useless. But Jack now knew one thing: whoever was making use of the computer was very anxious that no one catch on, and the trail led straight to POKEY.

"McGinty, you'd better head home. I won't need you anymore, tonight."

"Right, Boss." McGinty shuffled off, toward his address in RAM Estates, still grinning brainlessly. Jack switched on the communicator again.

"Hubie, I'm going to take a walk. I'll see you in the morning."

"Jack, you forgot your raincoat. It might rain. Shall I..." Truehart clicked off the communicator and stowed it in his pocket before the robot could finish. "I'm going to have to get him reprogrammed one of these days," he muttered, as he headed north, toward POKEY.



POKEY was the toughest neighborhood on the whole Mother Board. The POKEY people were only three feet tall, but they were built like oxen. All input into the computer was onloaded by the POKEY people, and years of manual labor had left them looking like miniature Incredible Hulks — that is, if you could overlook the fur. But what was most curious about these tiny people was that they had singing voices of ethereal beauty, and they loved to harmonize. It was like finding the Mormon Tabernacle Choir in a Neanderthal cave.

Jack could hear the music as he walked toward POKEY. It came in waves, first sweet and clear, then harsh and distorted. Up and down the scale they sang, the highest note five and one-half octaves above the lowest. Two more steps and Jack Truehart turned the last corner of the data bus to face POKEY.

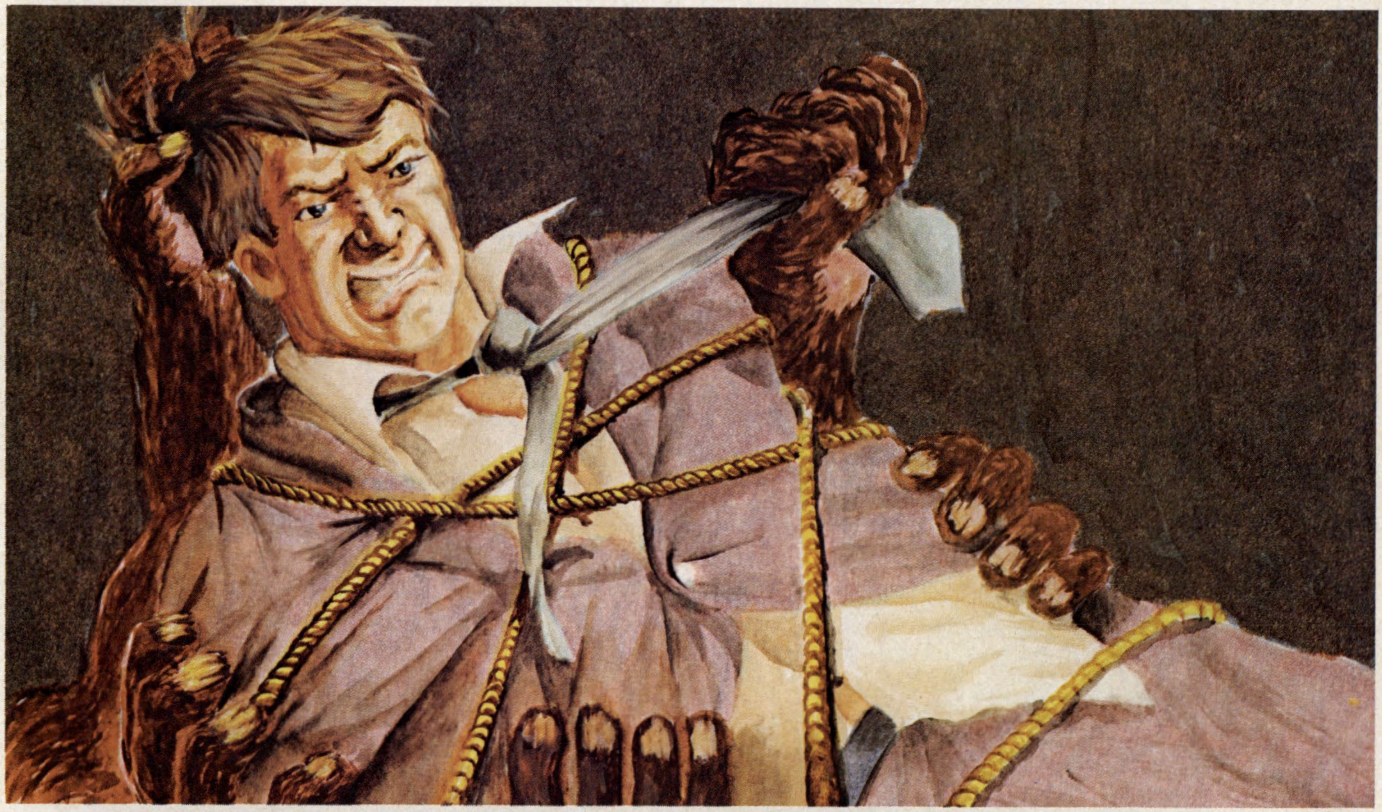
The chip was huge. Out from one side ran a line to the serial port, beside it, the lines to the keyboard and the paddle controllers. These thick cables were the connection between the Mother Board and the outside world. Along the other face of the chip ran the data and address buses, along which ebbed and flowed the vast quantities of information generated by the system.

Inside the chip were the great choir halls, four each, where the POKEY's made their music. Also inside, timers to regulate every activity on the Mother Board, and, in an office buried deep within POKEY, the random number generator. Each of these rooms and halls were staffed by the POKEY people.

Jack took a deep breath and stepped through the double doors of the data bus, into the chip itself. The din of thousands of POKEY's singing and laboring, shouting and straining, nearly deafened him. He clung to the wall, battered by the noise and confusion before him.

After a moment he began to catch his breath and noticed that he was standing on a platform that looked out onto a great hall. Below him the POKEY's had formed a bucket-brigade-like line along which passed the sparkling green and blue data bits as they came in from the serial port, 10 at a time. The first bit seemed a signal to the workers below that data was on the way. They redoubled their efforts and pulled in the eight data bits that followed. After the last data bit, one last bit straggled in, as if to signal the byte's end. This entire process was accompanied by loud beeps of

"We're patriots here, buddy, and don't you forget it."



effort from the laboring POKEY's. The 10 bits were gathered at the back of the room. There, still more POKEY's lopped off-the start and stop bits, and bundled up the middle eight into a single byte-sized package, which they sent up a conveyor belt to an opening just below Jack's feet. From there, he knew, it would be sped down the data bus to a holding area for processing. This entire process took only milliseconds and continued ceaselessly before Jack's amazed eyes. In fact, he was so engrossed in their labors, he hardly noticed the security POKEY that was jabbing at his kneecaps with a sharp stick.

"Hey you, I'm talkin' to you, Buster! What are you doin' here?"

The little man kept up the jabbing and Jack was getting more than a little annoyed. He pulled out his billfold and flipped it open.

"Jack Truehart, CIO. I'm investigating a complaint of unauthorized use. And stop poking me!"

"Unauthorized use! Are you insinuatin' that a POKEY would take advantage of the system? We're patriots here, buddy, and don't you forget it. Besides, who has time? We've got work to do. Not like you sniveling layabouts in the OS. I'm runnin' you in for a 202: Aggravated Snoopiness With Intent To Insult. C'mon with me."

The little creature started waddling down the corridor. Jack turned and began to go in the opposite direction. He didn't get very far. The POKEY had been watching out of the corner of his eye.

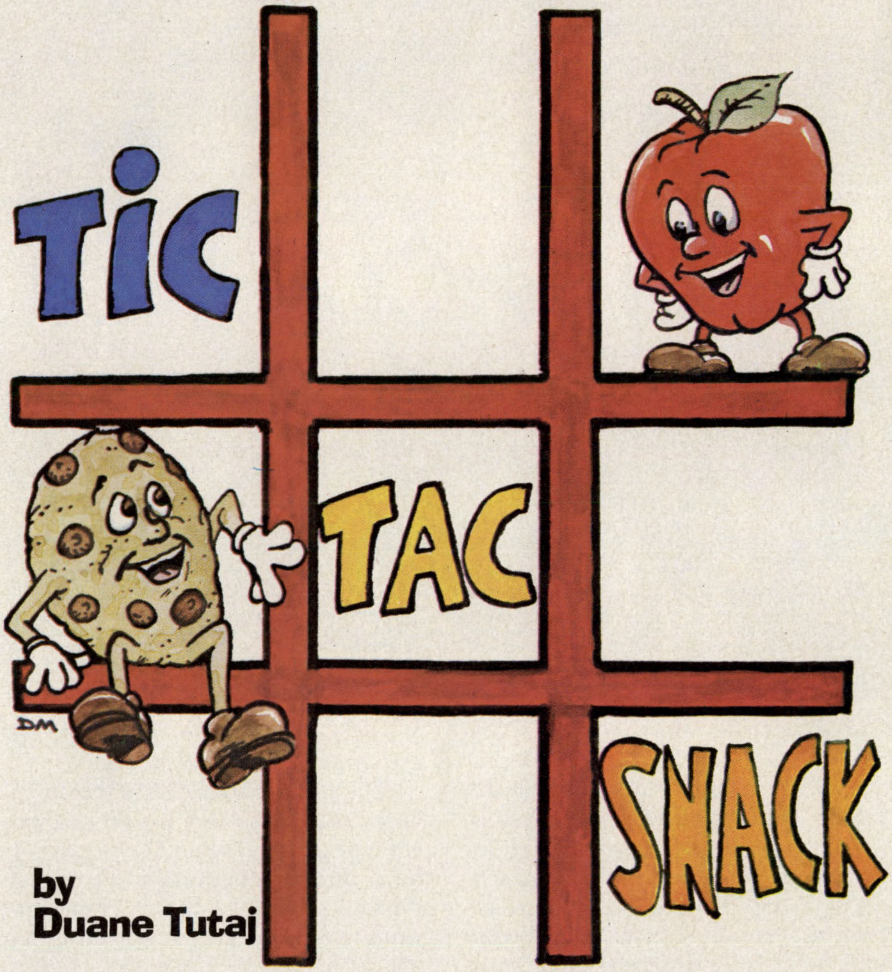
"Resist arrest, will ya! Get him boys!"

To Jack, it seemed like a hundred furry bowling balls had dropped on top of his head. Within seconds he was trussed up like an Easter ham and riding on the shoulders of a half dozen POKEY's. They were cheering and jeering, in their bizarre way, as they carried him. Walking ahead, the constable POKEY brandished his stick in the air and sang.

Fleshy meat, strong and sweet,
Home-brewed ale, dark or pale,
Round the table the POKEY's meet,
To laugh and sing and share a tale.
To our kitchen we bring a feast,
A tall and dark and vicious beast,
We'll slash him and bash him, 'til he gives up the ghost,
Then into the oven, for 10 hours he'll roast,
Fleshy meat, strong and sweet,
Tonight the POKEY's will devour a treat!

Jack was beginning to wish he had stayed at home, after all.

(To be continued)



**by
Duane Tutaj**

The process of writing a video game can be an exciting and challenging proposition. Not only is it necessary to develop an idea but one must also program a computer to execute the commands. This article will describe the process of translating ideas into a working Atari program. Tic-Tac-Toe was chosen so that the process could be explained as simple as possible.

Tic-Tac-Snack is a simplified version of Tic-Tac-Toe. There is one minor change: the traditional X and O are replaced with an apple and chocolate chip cookie.

Each player types the number of the square he wishes the apple or cookie placed into. The player's number and symbol name (our apple or cookie) appear in the text window indicating whose turn it is. If a player chooses a box that is already occupied, the computer will ask him to choose again. Three things occur at the end of a game: the players' score is shown; a running total of games played is displayed; and the players are given the opportunity to begin a new game.

Beginning Your Program

The first step in writing any program is to organize your ideas. Few people enjoy the tedium of flow charting, but it is an integral part of program design. Some people are talented enough to program from "scratch," but I have found that time set aside for planning and organizing can easily save hours of work.

Whether you write an outline, a detailed flow chart, or a list of modules, organizing your program will help the flow of your program and will also simplify debugging it. Good organization also makes it much easier to change your program with a minimum of hassle.

Now, let's talk about *Tic-Tac-Snack*. I wanted to write a Tic-Tac-Toe game but wanted to use something a little less drab than the traditional X's and O's. To show off the Atari's graphics and colors, I decided to substitute apples and cookies. Everything else about Tic-Tac-Toe remains the same.

Here is a list of the modules needed to — or sections to — create *Tic-Tac-Snack*:

1) Instructions
2) Title screen
3) Draw blank board
4) Draw individual apple or cookie
5) Have simple, one-key input from keyboard
6) Place correct figure in blank box
7) Check for correct input and keep score of results
8) Check after every input and see if game is over
9) Design end screen over and ask for replay
10) Program appropriate sounds.

By listing the program objectives, the problems I would have to solve in order for *Tic-Tac-Snack* to work are clarified. By visualizing the end product, I could begin programing the individual modules. Remember, the solutions to each of these problems represent my programing approach. Yours may be entirely different, yet just as functional.

A Closer Look

Lines 1 thru 4 create the original screen which contain the title and the simple sound effect of munching. By checking the console keys the game can begin with a simple press of the start button.

After this is done, the program prints a short screen message and then initializes all the variables and reads in the machine-language subroutines that will be used to draw the board, apple and cookie.

While images could have been plotted and drawn to in the Graphics 7 mode, I felt that that process would be too slow. Instead, I used a public-domain utility to draw rectangles of different colors and another utility to flip the images using string data. These machine-language routines are placed in strings I1$ for the first image and I2$ for the second image. The routine for flipping the images is in E$ and the rectangle routine is in R$. (These routines are between lines 50 and 865.)

The rectangle routine uses a USR with the following conditions: (R,Y,X,width,height,color) R is the address of the string R$; Y and X are the starting screen coordinates; width and height are how many bytes of data you wish to draw; and color is one of the four colors in Graphics 7. The numbers 0, 85, 170, and 255 provide a solid color while any other number to 255 will create a stripe effect.

The routine to flip the images is similar. The condition is USR(E,X,Y,I) where E is the address of string E$, followed by the upper left-hand coordinates of the box of data to be flipped. This routine will flip a box of data 5 bytes wide (20 pixels) by 12 lines high. (This requires 60 bytes of data per image.) I is the address of the String I1$ and I2$ which are the images for the apple and the cookie. Use the same type of color data numbers that were used in the rectangle routine for solid colors or stripes.

Up to this point, we've created the title screen and have pinned down a couple of graphic routines. The next step is to open the keyboard for input and set the background color to black (poke 710,0) and turn off the cursor (poke 752,1) in lines 10 thru 45.

You may have noticed that *Tic-Tac-Snack* jumps through several of the routines. The reason is that the for-next loops execute faster at the beginning of a program. Starting the main loop at line 2200 will give more area to work with as the rest of the logic for this program is developed.

At line 2200 the main loop starts. From here, the program returns to line 900 and the rectangle routine draws all the squares. The colors of the borders and background are changed as well. Starting at line 954 the numbers of the boxes are plotted and drawn. Then a quick check is implemented to see if any boxes contain a previous input. If so, that box is filled with the correct symbol and the next box is checked. After each square has been checked the program returns to the main loop.

The current player is given an option of which square he wishes to fill. After his input, a check is made to see if that box is already occupied and whether the key pressed is between 1 and 9. Assuming that the square selected was unoccupied, the correct symbol is flipped to the screen with a calculation that jumps the program to the correct line between 1000 and 1109 (which draws the symbol on the screen). Next there is a check to see if a winning combination is present. If not, the square chosen is also placed in an array for future checking to determine which squares remain open for use. The player number is changed to the opponent and the main loop starts again.

When a correct combination is found, or when all the squares are occupied, a message is printed to the screen and a sound is executed. This is followed by a new screen which shows the total score between the two opponents. A choice is also given to start again, change players or quit.

As you can see, once the decisions were made on how to flip the apples and cookies, it became very easy to program the remaining logic. Again, the importance of flow charting beforehand cannot be over emphasized!

How you go about the individual steps of programming each line and which techniques you use will depend on your background and creativity. There are numerous ways of producing screen colors, but it will be your decision to choose one method that successfully fits in with the other elements of your program.

Finally, it's important to realize that you can only design what you are capable of programming. Once one programmer demonstrated the Space Invaders graphics technique, many other programmers experimented until they too could do the same; and some even improved on the original. Remember, your Atari will only do what *you* program it to do. Your Atari does not know its own limitations: the limitations are your own. By reading, examining, and experimenting, you can develop new and exiting combinations of programming techniques.

Now for that graphic adventure game...

Duane Tutaj is a contributing writer living in Addison, Illinois.

Tic Tac Snack

```
1 REM TIC TAC SNACK-COPYRIGHT 1983-DUA
NE TUTAJ
2 GRAPHICS 18:POSITION 3,2:? #6;"TIC T
AC SNACK":POSITION 8,5:? #6;"by":DIM I
NV$(11)
3 POSITION 4,7:INV$="DUANE TUTAJ":GOSU
B 5000:POSITION 4,10:INV$="push start"
:GOSUB 5000
4 GOSUB 30000:IF PEEK(53279)=6 THEN GR
APHICS 18:POKE 712,148:POSITION 1,7:?
#6;"one moment please":GOTO 7
5 GOTO 4
7 DIM GAME(9),B(9),TIC(9)
8 FOR J=1 TO 9:GAME(J)=0:TIC(J)=0:B(J)
=0:NEXT J
9 GOSUB 50
10 OPEN #1,4,0,"K:"
40 CAT=0
44 POKE 710,0:POKE 752,1
45 GOTO 2200
46 SOUND 0,30,10,10:FOR J=1 TO 40:NEXT
 J:SOUND 0,50,10,10:FOR J=1 TO 50:NEXT
 J:SOUND 0,0,0,0:RETURN
47 SOUND 0,70,6,10:FOR J=1 TO 90:NEXT
J:SOUND 0,0,0,0:RETURN
```

```
48 FOR J=1 TO 6:SOUND 0,30,10,10:FOR J
J=1 TO 10:NEXT JJ:SOUND 0,0,0,0:NEXT J
49 SOUND 0,80,10,10:FOR J=1 TO 30:NEXT
 J:SOUND 0,0,0,0:RETURN
50 DIM I1$(60):FOR I=1 TO 60:READ A:I1
$(I,I)=CHR$(A):NEXT I:I1=ADR(I1$)
100 DATA 170,170,170,10,170,170,170,16
8,42,170,170,170,160,170,170,170,165,6
5,86
110 DATA 170,170,85,65,85,106,169,85,8
5,85,90
120 DATA 169,85,85,85,90,169,85,85,85,
90,170,85,85,85,106,170,149,85,85
130 DATA 170,170,170,170,170,170,170,1
70,170,170,170
150 DIM I2$(60):FOR I=1 TO 60:READ A:I
2$(I,I)=CHR$(A):NEXT I:I2=ADR(I2$)
200 DATA 170,170,170,170,170,170,170,1
70,170,170,170,171,255,250,170,170,175
,63,254
210 DATA 170,170,191,255,255,170,170,2
55,255,207,234
220 DATA 170,255,243,255,234,170,243,2
55,255,234,170,191,255,243,170,170,175
,243,254
230 DATA 170,170,171,255,250,170,170,1
70,170,170,170
400 REM **ROUT FOR IMAGES IN GR. 7
410 DIM E$(123):FOR I=1 TO 123:READ A:
E$(I,I)=CHR$(A):NEXT I:E=ADR(E$)
420 DATA 104,104,104,133,195,104,104,1
33,186,104,133,213,104,133,212,169,0,1
33,187,165,186

430 DATA 10,38,187,10,38,187,10,38,187
,133,186,164,187,10,38,187,10,38,187,2
4,101,186,133,186,152
440 DATA 101,187,133,187,24,165,186,10
1,195,144,2,230,187,24,101,88,133,186,
165,187,101,89,133,187
450 DATA 169,12,133,195,162,5,160,0,17
7,212,145,186,24,165,212,105,1,133,212
,144,2
460 DATA 230,213,24,165,186,105,1,133,
186,144,2,230,187,202,208,227,24,165,1
86,105,35,133,186,144,2
470 DATA 230,187,198,195,208,208,96
800 REM ** ROUT FOR RECTANGLE
810 DIM R$(108):FOR I=1 TO 108:READ A:
R$(I,I)=CHR$(A):NEXT I:R=ADR(R$)
820 DATA 104,104,104,133,203,104,104,1
33,205,104,104,133,206,104,104,133,207
,104,104,133,208,169,0,133,204
822 DATA 165,203,10,38,204,10,38,204,1
0,38,204,133,203,166,204,10,38,204,10,
38,204,24,101,203,133,203,138
830 DATA 101,204,133,204,24,165,203,10
1,205,133,203,144,2
840 DATA 230,204,24,165,203,100,88,133
,203,165,204,101,89,133,204,160,0,166,
206,165,208,145,203,200,202,208
850 DATA 250,24,165,203,105,40,133,203
,144,2,230,204,198,207,208,229,96
865 RETURN
900 GRAPHICS 7:POKE 708,50:POKE 710,38
910 A=USR(R,4,16,40,78,170)
915 A=USR(R,4,16,2,78,85)
920 A=USR(R,4,54,2,78,85)
925 A=USR(R,78,16,40,4,85)
930 A=USR(R,2,16,40,4,85)
935 A=USR(R,2,29,1,78,85)
940 A=USR(R,2,42,1,78,85)
945 A=USR(R,27,16,40,2,85)
950 A=USR(R,52,16,40,2,85)
954 REM #1
955 COLOR 0:PLOT 15,6:DRAWTO 15,12:PLO
T 15,6:DRAWTO 13,8:PLOT 13,12:DRAWTO 1
7,12
956 REM #2
957 COLOR 0:PLOT 62,6:DRAWTO 62,8:PLOT
 62,6:DRAWTO 66,6
958 PLOT 66,6:DRAWTO 66,8:DRAWTO 62,10
:DRAWTO 62,12:DRAWTO 66,12
959 REM #3
960 COLOR 0:PLOT 114,6:DRAWTO 118,6:DR
AWTO 118,12:DRAWTO 114,12:PLOT 118,9:D
RAWTO 114,9
961 REM #4
962 COLOR 0:PLOT 14,29:DRAWTO 14,32:DR
AWTO 18,32:PLOT 18,29:DRAWTO 18,36
963 REM #5
964 COLOR 0:PLOT 62,29:DRAWTO 66,29:PL
OT 62,29:DRAWTO 62,32:DRAWTO 66,32:DRA
WTO 66,36:DRAWTO 62,36

965 REM #6
966 COLOR 0:PLOT 114,29:DRAWTO 114,36:
DRAWTO 118,36:DRAWTO 118,32:DRAWTO 114
,32
967 REM #7
968 COLOR 0:PLOT 13,54:DRAWTO 17,54:DR
AWTO 17,61

969 REM #8
970 COLOR 0:PLOT 63,54:DRAWTO 65,54:DR
AWTO 65,58:PLOT 63,54:DRAWTO 63,58
971 PLOT 62,58:DRAWTO 66,58:DRAWTO 66,
61:DRAWTO 62,61:DRAWTO 62,58
972 REM #9
973 COLOR 0:PLOT 114,54:DRAWTO 118,54:
DRAWTO 118,61:PLOT 114,54:DRAWTO 114,5
7:DRAWTO 118,57
975 FOR J=1 TO 9
976 LET Q=GAME(J)
978 IF Q<>0 THEN GOSUB Q
979 NEXT J
999 RETURN
1000 REM DRAW SQUARES AND CIRCLES
1001 A=USR(E,5,9,I1):RETURN
1002 A=USR(E,18,9,I1):RETURN
1003 A=USR(E,30,9,I1):RETURN
1004 A=USR(E,5,33,I1):RETURN
1005 A=USR(E,18,33,I1):RETURN
1006 A=USR(E,30,33,I1):RETURN
1007 A=USR(E,5,58,I1):RETURN
1008 A=USR(E,18,58,I1):RETURN
1009 A=USR(E,30,58,I1):RETURN
1100 REM DRAW SQUARES AND CIRCLES
1101 A=USR(E,5,9,I2):RETURN
1102 A=USR(E,18,9,I2):RETURN
1103 A=USR(E,30,9,I2):RETURN
1104 A=USR(E,5,33,I2):RETURN
1105 A=USR(E,18,33,I2):RETURN
1106 A=USR(E,30,33,I2):RETURN
1107 A=USR(E,5,58,I2):RETURN
1108 A=USR(E,18,58,I2):RETURN
1109 A=USR(E,30,58,I2):RETURN
```

```
2200 GOSUB 900:POKE 752,1:P=INT(RND(0)
*2)+1
2205 POKE 656,1:? "
                  ":REM 36 SPACES
2206 POKE 656,2:? "
                  ":GOSUB 46:REM 36 SPA
CES
2210 IF P=2 THEN POKE 656,1:? "     PLA
YER #1 --------APPLE":POKE 656,2:? "
     PICK A SQUARE ":GOTO 2250
2220 IF P=1 THEN POKE 656,1:? "     PLA
YER #2 -------COOKIE":POKE 656,2:? "
     PICK A SQUARE ":GOTO 2250
2250 GET #1,H
2260 GOTO 2300
2300 IF H<49 OR H>57 THEN GOTO 2305
2302 GOTO 2310
2305 POKE 656,2:? "YOU CAN'T TAKE THAT
 NUMBER, TRY AGAIN":GOSUB 47:FOR J=1 T
O 200:NEXT J:? CHR$(125):GOTO 2210
2310 H=H-48
2320 IF B(H)=H THEN GOTO 2305
2330 B(H)=H
2340 IF P=2 THEN GOSUB 1000+H:GOTO 240
0
2350 IF P=1 THEN GOSUB 1100+H:GOTO 240
0
2400 IF P=2 THEN GAME(H)=1000+H:TIC(H)
=1
2410 IF P=1 THEN GAME(H)=1100+H:TIC(H)
=2
2420 GOTO 2500
2500 REM CHECK TO SEE IF GAME IS OVER
2520 IF TIC(1)=1 AND TIC(2)=1 AND TIC(
3)=1 THEN GOTO 2600
2521 IF TIC(1)=1 AND TIC(4)=1 AND TIC(
7)=1 THEN GOTO 2600
2522 IF TIC(1)=1 AND TIC(5)=1 AND TIC(
9)=1 THEN GOTO 2600
2523 IF TIC(4)=1 AND TIC(5)=1 AND TIC(
6)=1 THEN GOTO 2600
2524 IF TIC(7)=1 AND TIC(8)=1 AND TIC(
9)=1 THEN GOTO 2600
2525 IF TIC(2)=1 AND TIC(5)=1 AND TIC(
8)=1 THEN GOTO 2600
2526 IF TIC(3)=1 AND TIC(6)=1 AND TIC(
9)=1 THEN GOTO 2600
2527 IF TIC(3)=1 AND TIC(5)=1 AND TIC(
7)=1 THEN GOTO 2600
2530 IF TIC(1)=2 AND TIC(2)=2 AND TIC(
3)=2 THEN GOTO 2600
2531 IF TIC(1)=2 AND TIC(4)=2 AND TIC(
7)=2 THEN GOTO 2600
2532 IF TIC(1)=2 AND TIC(5)=2 AND TIC(
9)=2 THEN GOTO 2600
2533 IF TIC(4)=2 AND TIC(5)=2 AND TIC(
6)=2 THEN GOTO 2600
2534 IF TIC(7)=2 AND TIC(8)=2 AND TIC(
9)=2 THEN GOTO 2600
2535 IF TIC(2)=2 AND TIC(5)=2 AND TIC(
8)=2 THEN GOTO 2600
2536 IF TIC(3)=2 AND TIC(6)=2 AND TIC(
9)=2 THEN GOTO 2600
2537 IF TIC(3)=2 AND TIC(5)=2 AND TIC(
7)=2 THEN GOTO 2600
2540 FOR J=1 TO 9
2550 IF TIC(J)=1 OR TIC(J)=2 THEN CAT=
CAT+1
```

```
2560 NEXT J
2570 IF CAT=9 THEN GOTO 2700
2575 CAT=0
2576 IF P=1 THEN P=2:GOTO 2580
2577 IF P=2 THEN P=1
2580 GOTO 2205
2600 REM WINNING BOARD
2620 IF P=2 THEN WINS1=WINS1+1:LOSS2=L
OSS2+1:? CHR$(125):POKE 656,1:? "PLAYE
R #1 WINS!!!"
2630 IF P=1 THEN WINS2=WINS2+1:LOSS1=L
OSS1+1:? CHR$(125):POKE 656,1:? "PLAYE
R #2 WINS!!!"
2640 GOSUB 12000
2650 GOTO 3000
2700 CAT=0
2710 ? CHR$(125):POKE 656,1:? "CATS GA
ME--NOBODY WINS":SOUND 0,100,6,10:SOUN
D 1,137,4,10
2715 FOR J=1 TO 100:NEXT J:SOUND 0,0,0
,0:SOUND 1,0,0,0:FOR J=1 TO 500:NEXT J
2720 GOTO 3000
3000 REM PRINT OVERALL TEAM SCORES FOR
 GAME
3010 GRAPHICS 0:POKE 710,194:POKE 752,
1
3055 POSITION 15,4:INV$="TOTAL GAMES":
GOSUB 6000
3060 POSITION 5,7:? "PLAYER #1 HAS WON
 ";WINS1;" AND LOST ";LOSS1
3070 POSITION 5,9:? "PLAYER #2 HAS WON
 ";WINS2;" AND LOST ";LOSS2
3080 FOR JJJ=1 TO 70:NEXT JJJ
3110 POSITION 15,12:? "DO YOU WISH TO
"
3120 POSITION 6,15:? "1) PLAY AGAIN -S
AME PLAYERS"
3130 POSITION 6,17:? "2) PLAY AGAIN -N
EW  PLAYERS"
3140 POSITION 6,19:? "3) QUIT"
3150 GET #1,H
3160 IF H<49 OR H>51 THEN GOSUB 47:POS
ITION 6,19:? " ":GOTO 3150
3170 IF H=49 THEN GOTO 3200
3180 IF H=50 THEN RUN
3190 IF H=51 THEN GOTO 4000
3200 REM CLEAR ARRAYS
3210 FOR J=1 TO 9:GAME(J)=0:TIC(J)=0:B
(J)=0:NEXT J
3220 GOTO 2200
4000 GRAPHICS 0:END
5000 FOR INV=1 TO LEN(INV$):PUT #6,ASC
(INV$(INV))+128:NEXT INV:RETURN
6000 FOR INV=1 TO LEN(INV$):? CHR$(ASC
(INV$(INV))+128);:NEXT INV:? :RETURN
12000 REM WINNING SOUND
12010 FOR J=1 TO 40:SOUND 0,150-J,10,8
:SOUND 1,137+J-5,10,8:SOUND 2,100-J*2,
10,8:SOUND 3,75-J,10,8
12020 NEXT J
12030 FOR J=0 TO 3:SOUND J,0,0,0:NEXT
J
12040 RETURN
30000 FOR J=180 TO 80 STEP -7:SOUND 0,
J,6,10:SOUND 1,J,10,2:NEXT J
30020 SOUND 0,0,0,0:SOUND 1,0,0,0
30040 J=INT(RND(0)*50)+17:FOR JJ=1 TO
J:NEXT JJ:RETURN
```

Some Assembly Required

by Robert Peck

This month's column provides a program designed for a bulletin board. It is used to determine if the messages left on the board contain any language the computer bulletin board owner might find objectionable. He may then decide not to accept the message, or perhaps to hang up on the caller, or simply use the output from the program to signal the system operator (SYSOP) that something questionable has just come in.

The reason I have published this program here is it uses several features I will be explaining in future columns. The primary feature is the way parameters are passed to and from Atari BASIC. This will be the topic of the next column. Another feature is the exclusive use of fully relocatable code. (This means no matter where it is placed in the memory, it still does the same job.) This too will be a topic of a future column.

How this Program Works:

The user saves some space for a string in his program, here called E$. It needs only 180 locations maximum. Then another string is defined called A$ (you can have many of these as you will see below). A$ contains, in all capital letters, the definitions for all of the words you might find objectionable or word combinations, such as:

BADWORD or BADWORD or BAD WORD

The individual word combinations are separated, in A$, by an exclamation point (!). The maximum length of A$ is 255 characters, including the leading and trailing dollar-sign ($) which tells the machine language program where the string ends. The leading dollar sign is only a space holder but must be there.

B$ is a string of up to 255 characters given to the program, along with its length. B$ will be modified by the program by squishing all of its printable characters (ATASCII values 32 thru 127 only) into a row, and then making the scan for objectionable words. The revised length of B$ is returned as the first character of A$, so that is why there must be a spaceholder in

```
2 DIM E$(200)
3 REM WHERE PROGRAM WILL BE STORED
4 GRAPHICS 0:PRINT "GETTING READY...."
:PRINT
5 FOR N=1 TO 169:READ M:E$(N)=CHR$(M):
NEXT N
10 DIM A$(100)
20 A$="$JUNK1!BAD WORD!JUNK2!ANOTHER!Z
ZZ!$"
30 DIM B$(110)
40 PRINT "INPUT A SAMPLE STRING"
50 INPUT B$
60 X=USR(ADR(E$),ADR(A$),ADR(B$),LEN(B
$))
70 IF X=0 THEN 40
71 IF PEEK(X)<>33 THEN PRINT CHR$(PEEK
(X));:X=X+1:GOTO 71
72 PRINT "  IS NOT ACCEPTABLE LANGUAGE
"
80 GOTO 40
10010 DATA 104,104,133,207,133,215,104
,133,206,133
10020 DATA 214,230,206,104,133,209,133
,213,104,133
10030 DATA 208,133,212,104,104,133,203
,160,0,132
10040 DATA 204,132,205,164,204,196,203
,176,22,177
10050 DATA 208,200,132,204,201,32,144,
241,201,127
10060 DATA 176,237,164,205,145,208,200
,132,205,208
10070 DATA 228,165,205,133,211,160,0,1
77,206,201
10080 DATA 36,240,69,201,33,240,3,200,
208,243
10090 DATA 152,170,165,203,133,204,138
,168,136,48
10100 DATA 60,177,208,201,97,144,2,41,
223,209
10110 DATA 206,240,241,198,204,240,10,
230,208,208
10120 DATA 2,230,209,160,0,240,225,165
,213,133
10130 DATA 209,165,212,133,208,232,138
,24,101,206
10140 DATA 133,206,165,207,105,0,133,2
07,160,0
10150 DATA 240,181,169,0,133,212,133,2
13,240,9
10160 DATA 96,165,206,133,212,165,207,
133,213,165
10170 DATA 211,160,0,145,214,96,0,0,0,
0
```

```
00CB     10 PCB     =     $CB     ;DEFINE SOME WORKSPACE IN PAGE 0
00CC     20 PCC     =     $CC     ;WHICH WONT INTERFERE WITH BASIC
00CD     30 PCD     =     $CD     ;USED ONLY TEMPORARILY ANYWAY
00CE     40 PCE     =     $CE
00CF     50 PCF     =     $CF
00D0     60 PD0     =     $D0
00D1     70 PD1     =     $D1
00D2     80 PD2     =     $D2
00D3     90 PD3     =     $D3
```

the first character.

If an asterisk (*) represents a nonprintable character, such as a line feed or other cursor move, then the string: "This is a sneaky B****A***D**word" will become: "This is a sneaky BADword**D**word." When all of the nonprinting characters are removed, ASC(A$(1,1)) will show a value of 25 instead of the original string length. If "BADWORD" was in A$ somewhere to begin with, the value of X will point to the first character of that word in A$. Otherwise X will be zero if none of the bad words are found.

All letters are capitalized inside the compare routine before the compare happens, but the source string "case" is not changed.

Those users who have abused the bulletin board privilege also may read this and find creative ways around it. I hope this at least provides a building block others can use for future enhancements.

By the way, as a comparison to BASIC, the original version of this routine, in BASIC, took about 15-20 seconds to process a 200-character input line against a set of 20 bad-words. This version takes less than one second to operate.

```
00D4           0100 PD4    =    $D4
00D5           0110 PD5    =    $D5
00D6           0120 PD6    =    $D6
00D7           0130 PD7    =    $D7
0000           0140        *=   $5000
5000 68        0150 START  PLA              ;DISCARD COUNT OF PUSHES
               0151 ;                       ;RELY ON CALLER TO PUT RIGHT #
5001 68        0160        PLA
5002 85CF      0170        STA  PCF
5004 85D7      0180        STA  PD7         ;SAVE POINTER TO A$(1,1)
               0190 ;                      ;GET HIGH BYTE OF A$
5006 68        0200        PLA
5007 85CE      0210        STA  PCE         ;AND LOW BYTE ALSO
5009 85D6      0220        STA  PD6         ;SAVE POINTER TO A$(1,1)
500B E6CE      0230        INC  PCE         ;SAVE SPACE FOR LENGTH
500D 68        0240        PLA
500E 85D1      0250        STA  PD1         ;HIGH BYTE OF B$ POINTER
5010 85D5      0260        STA  PD5         ;WILL GO THRU HERE ONCE
               0270 ;                    ;FOR EACH WORD IN A$
5012 68        0280        PLA
5013 85D0      0290        STA  PD0         ;LOW BYTE OF B$ POINTR
5015 85D4      0300        STA  PD4
5017 68        0310        PLA              ;DISCARD HI BYTE OF B$ LEN
5018 68        0320        PLA              ;GET LOW BYTE
5019 85CB      0330        STA  PCB         ;SAVE IT (<255)
               0331 ;
               0332 ;                       ;NOW COMPRESS THE STRING BY
               0333 ;                       ;REMOVING ALL NONPRINTABLE
               0334 ;                       ;CHARACTERS
               0335 ;
               0336 ;                       ;PUT REVISED LENGTH OF THE
               0337 ;                       ;STRING INTO A$(1,1)
               0338 ;
501B A000      0340 KOMPRS LDY  #0
501D 84CC      0350        STY  PCC         ;POINT TO SOURCE PART OF STRING
501F 84CD      0360        STY  PCD         ;POINT TO DEST PART OF STRING
5021 A4CC      0370 KGET   LDY  PCC
5023 C4CB      0380        CPY  PCB         ;GOT TO END OF STRING YET?
5025 B016      0390        BCS  KDONE       ;IF SO, CONTINUE PROCESSING
5027 B1D0      0400        LDA  (PD0),Y
5029 C8        0410        INY
502A 84CC      0420        STY  PCC         ;BUMP SOURCE POINTER
502C C920      0430        CMP  #$20        ;MAKE SURE DATA IS PRINTABLE
               0440 ;                      ;PRINTABLE = ASCII 20-7F)
502E 90F1      0450        BCC  KGET        ;IF <20, SKIP COPYING
5030 C97F      0460        CMP  #$7F        ;OTHER END
```

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```
5032 B0ED    0470        BCS  KGET       ;ALSO SKIP
5034 A4CD    0480        LDY  PCD        ;GET DESTINATION POINT
5036 91D0    0490        STA  (PD0),Y
5038 C8      0500        INY
5039 84CD    0510        STY  PCD        ;BUMP DESTINATION PNTR
503B D0E4    0520        BNE  KGET       ;RELOCATABLE JUMP
503D A5CD    0530 KDONE  LDA  PCD        ;SAVE NEW B$ LENGTH
503F 85D3    0540        STA  PD3        ;IN D3 TEMPORARILY
5041 A000    0550        LDY  #0         ;NOW START SEARCH
             0560 ;                     ;ON MODIFIED STRING
5043 B1CE    0570 SRCH1  LDA  (PCE),Y    ;GET CHARACTER
             0580 ;                     ;FROM THE BAD-WORD STRING
             0590 ;                     ;LOOKING FOR THE END OF WORD
5045 C924    0600        CMP  #$24       ;DOLLAR SIGN IS END
5047 F045    0610        BEQ  STREND     ;STRING END
5049 C921    0620        CMP  #$21       ;STRING DELIMITER?
504B F003    0630        BEQ  WRDFND     ;FOUND A WORD
504D C8      0640        INY             ;MAKE A COUNT OF CHARACTERS
             0650 ;                     ;LOOKED AT SO FAR
504E D0F3    0660        BNE  SRCH1      ;KEEP GOING TILL FIND
             0670 ;                ;A BLANK
5050 98      0680 WRDFND TYA
5051 AA      0690        TAX             ;KEEP THE CHAR COUNT IN X
             0700 ;
5052 A5CB    0710        LDA  PCB        ;MOVE B$ COUNT INTO
5054 85CC    0720        STA  PCC        ;A COUNT-DOWN LOCATION
             0730 ;                     ;WILL USE AS SEARCH COUNTER
             0740 ;
5056 8A      0750 CMP0   TXA             ;MOVE COUNTER INTO Y
             0760 ;                     ;FOR THE SEARCH
5057 A8      0770        TAY
5058 88      0780 CMP1   DEY             ;THIS IS THE ACTUAL STR
             0790 ;                     ;COMPARE LOOP, STARTS
             0800 ;                     ;ON LAST LETTER FIRST,
             0810 ;                     ;DIES ON FIRST NONCMP
5059 303C    0820        BMI  FOUND      ;IF TRIED ALL AND NO
             0830 ;                     ;MISCOMPARES, THEN DOES A FOUND
505B B1D0    0840 CMP2   LDA  (PD0),Y    ;GET A B$ PIECE
505D C961    0850        CMP  #$61       ;SEE IF LOWER CASE LTR
505F 9002    0860        BCC  CMP3
5061 29DF    0870        AND  #$DF       ;MAKE IT UPPER CASE
5063 D1CE    0880 CMP3   CMP  (PCE),Y    ;SEE IF CHARACTERS
             0890 ;                     ;ARE MATCHING
5065 F0F1    0900        BEQ  CMP1       ;IF SO, GO DO NEXT ONE
5067 C6CC    0910        DEC  PCC        ;IF DIDNT MATCH, BUMP
             0920 ;                     ;THE B$ POINTER TO NEXT
             0930 ;                     ;AND TRY THE SAME WORD
             0940 ;                     ;AGAIN (LOOKING FOR
             0950 ;                     ;EMBEDDED OCCURRENCE)
5069 F00A    0960        BEQ  BSEND      ;IF PCC=0 THEN DONE
             0970 ;                     ;WITH THE INPUT STRING
             0980 ;                     ;AND CAN GO ON TO THE
             0990 ;                     ;NEXT WORD AND REPEAT
             1000 ;                     ;TILL ALL BAD WORDS
             1010 ;                     ;ARE CYCLED THRU.
506B E6D0    1020        INC  PD0        ;BUMPS THE B$ POINTER
506D D002    1030        BNE  NOTD1
506F E6D1    1040        INC  PD1
5071 A000    1050 NOTD1  LDY  #0
5073 F0E1    1060        BEQ  CMP0       ;THIS FORCES A BRANCH
             1070 ;                     ;ALWAYS, AND MAKES THE
             1080 ;                     ;CODE FULLY RELOCATABLE
             1090 ;                     ;FORCES A COMPARE TO ALL
             1100 ;                     ;OF B$
5075 A5D5    1110 BSEND  LDA  PD5        ;RESTORE THE B$
             1120 ;                     ;ORIGINAL POINTER
             1130 ;                     ;FOR THE NEXT BAD
             1140 ;                     ;WORD
5077 85D1    1150        STA  PD1
5079 A5D4    1160        LDA  PD4
507B 85D0    1170        STA  PD0
```

```
507D E8      1180        INX           ;X POINTS TO BLANK
             1190 ;                    ;SPACE IN BAD WORD STR
             1200 ;                    ;SO INX POINTS TO FIRST
             1210 ;                    ;CHARACTER IN THE NEXT
             1220 ;                    ;WORD
507E 8A      1230        TXA           ;MOVE X WHERE USABLE
507F 18      1240        CLC
5080 65CE    1250        ADC  PCE      ;NOW BUMP POINTER OF
             1260 ;                    ;BAD WORDS TO NEXT ONE
5082 85CE    1270        STA  PCE      ;USING THE X VALUE
5084 A5CF    1280        LDA  PCF
5086 6900    1290        ADC  #0
5088 85CF    1300        STA  PCF      ;16 BIT INCREMENT
508A A000    1310        LDY  #0       ;HAVE TO SET Y TO 0
             1320 ;                    ;ANYHOW, SO MAKE FULLY
             1330 ;                    ;RELOCATABLE THIS WAY
508C F0B5    1340        BEQ  SRCH1    ;JUMP ALWAYS. (RELOC)
             1350 ;
508E A900    1360 STREND LDA  #0       ;END OF THE STRING
5090 85D4    1370        STA  PD4
5092 85D5    1380        STA  PD5      ;WITH NOTHING FOUND
5094 F009    1390        BEQ  FOUND1   ;RELOC JUMP
5096 60      1400        RTS
5097 A5CE    1410 FOUND  LDA  PCE      ;GET LOW BYTE
5099 85D4    1420        STA  PD4      ;OF POINTER TO THE
509B A5CF    1430        LDA  PCF      ;FIRST CHARACTER OF THE
509D 85D5    1440        STA  PD5      ;WORD WHICH WAS THE
             1445 ;
             1450 ;                    ;ONE FOUND AND RETURN IT TO THE
             1460 ;                    ;CALLER IN THE FP ACCUMULATOR.
             1470 ;                    ;THIS WAY CAN SAY WHICH WORD
             1480 ;                    ;WAS EMBEDDED.
509F A5D3    1490 FOUND1 LDA  PD3      ;GET B$ LENGTH
50A1 A000    1500        LDY  #0
50A3 91D6    1510        STA  (PD6),Y  ;PUT INTO A$(1,1)
50A5 60      1520        RTS
             1530 ;
             1540 ;
             1550 ;CALLING SEQUENCE IS:
             1560 ;
             1570 ; X=USR(ADR(PROG$),ADR(A$),
             1580 ;   ADR(B$),LEN(B$))
             1590 ;
             1600 ; ON RETURN, X=0 (FALSE) IF
             1610 ; STRING IS NOT FOUND,
             1620 ;
             1630 ;            X=POINTER TO FIRST
             1640 ;            ADDRESS OF FOUND
             1650 ;            WORD
             1660 ;
             1670 ;
             1680 ; WHERE PROG$ IS THE STRING WHICH
             1690 ; CONTAINS THIS PROGRAM, AND
             1700 ; WHERE A$ IS LOOKS LIKE THIS:
             1710 ;
             1720 ;    A$="$BAD1!BAD2!WORD WITH BLANKS!BAD3$"
             1721 ;
             1730 ; COMPARISON DATA CAN USE EMBEDDED BLANKS AS SHOWN.
             1740 ;
             1750 ; SOURCE STRING (B$) WILL BE AUTO
             1760 ; SHORTENED TO REMOVE ALL NONPRINTING CHARACTERS.
             1770 ; ACCEPTS ONLY ASCII $20-7F.
             1780 ;
             1790 ; NEW LENGTH OF B$ RETURNED IN A$
             1791 ; USER CAN ACCESS NEW LENGTH BY:
             1800 ; VAL(A$(1,1)) OR PEEK(ADR(A$))
             1801 ;
             1802 ; USER CAN SHORTEN TO NEW LENGTH
             1803 ; BY: B$(N)=B$(N,N) WHERE N=
             1804 ; VAL(A$(1,1) OR N=PEEK(ADR(A$))
50A6         1810        .END
```

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Advanced User Forum

by Russ Wetmore

A number of you have asked me to explain further how I use an assembler, rather than just which one. I personally use the *Atari Macro Assembler*. I have logged thousands of hours of work using *AMAC*, although it is not flawless, it does a pretty good job. In this three part series, I will try to explain several of the less used or misunderstood commands, show you how some of them can be used in your programming, and even clue you in on some features not mentioned in the manual. In addition, I'll show you my macro library and how to use it.

One quick note: although this series is aimed at *AMAC* users, several of the concepts will carry over to other macro assemblers, such as *MAC/65* and *ATMASD*.

Commands with Problems

Some *AMAC* commands just flat out don't work. Why they don't is a mystery to me. Any substantial piece of software like *AMAC* (especially software designed to be used for program development) should at least work as outlined in the manual. The first time I used *AMAC* it was a little disheartening to type the examples shown in the documentation only to find they didn't work. One would think they would have at least left the questionable commands out of the manual.

One such command is USE. There are many applications where the USE command would come in handy. It is supposed to be used to designate "consecutive pieces of code in discontiguous source segments." What this means is you can write several sections of your program together in one place that will end up in different areas of memory. I know that you can simulate this by brute-force ORGing your program, but the assembler should be able to do this without having to keep track of absolute addresses. Luckily, you can simulate USE using macros (more on that in the next installment.)

One command that works after a fashion but not as advertised is LIST. In particular, the LIST * function won't perform as stated in the manual. The idea is to be able to "pop" a stack of parameters for the LIST command, and to return the LIST parameters to what they were before the previous LIST command. This would be useful for conditional assemblies where you can control what gets printed based on, say, a value assigned to a label. You might not want to have a data table printed out each time you assemble, for example. It would be nice to be able to say "Go back to what you were doing before," in case you couldn't be sure at a point in the program just what the LIST parameters were.

The only fix for this is to manually keep track of what LIST parameters you are using in all modules. I use lots of IF ENDIF blocks in assemblies to give various listing formats depending on a preset variable.

VFD is a useful command for building data tables where the arbitrary 8-bit "byte" boundaries don't apply. For example, I needed to compact screen images because of their restrictive size. The plan I hit on was this. More than 50% of the data fell into one of four categories:

1 byte of $00
2 bytes of $00's
1 byte of $FF
2 bytes of $FF's

You can represent those four patterns in 2 bits. Anything else would be represented by the byte itself, 8 bits. I needed a "flag" bit also, to let me know what kind of data was involved — compacted pattern number or byte data. I designated that a 0 bit would mean the next 2 bits that followed represented a pattern number. A 1 bit would mean that the next 8 bits to follow were absolute data. This scheme allowed me to compact my data tables into an area about 60% of their original size.

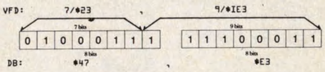
VFD format is:

```
VFD total\data
[,total\data...]
```

where total is the size of the data that follows in number of bits. *AMAC* keeps assigning bits sequentially until it fills out a byte, then starts on the next one. So, for example,

```
VFD 7\$23,9|$1E3
```

breaks down to:



which is the same as saying:

```
DB $47,$E3
```

except that the VFD construct more clearly shows the nature of the data format.

So, in my example above, if I had the following data:

```
$FF,$FF,$3A,$00
```

and 1 and 2 represented the patterns "2 $FF's" and "1 $00" respectively, I could represent it in compacted form in assembler as:

```
VFD 3\1,9\$13A,3\2
```

Trouble is, this only takes up a total of 15 bits. If I have normal data or program following this statement, *AMAC* is supposed to pad the last byte out with zeroes. It doesn't. In addition, since the *P pointer is never updated (the assembler pointer that points to the last bit position used) the next time you attempt a VFD statement, it'll start putting data in the wrong place.

The fix for this is to end each VFD block with:

```
VFD 7\0
ORG *O
LOC *L
```

This assures that the last byte is padded out with zeroes and the pointers are all updated properly.

More Problems

Probably the most infamous problem with *AMAC* is in its symbol table. Its main use, that of being used by the assembler to look up addresses associated with labels, works properly (most of the time) but reference listings often go haywire. *AMAC* is supposed to list only those SYSTEXT labels that are referenced in your program. Not always so. It's supposed to flag you when a normal label hasn't been referenced. Sometimes, invisible labels are printed, and some normal ones disappear. Granted, most of these errors start creeping in when the symbol table starts filling and many people write programs that never overflow the assembler. I do, however, and the end of a long program development is no time to start worrying about errors induced by another program.

The listing functions only seem to want to work with the Atari 825 and Okidata 82A printers. If you use an Epson or an NEC/Prowriter, for example, the listings will be too long for the page. Most people have figured out that Epson will page properly if you specify PS = 57 in the *AMAC* command line. However, you won't be able to use the nice PAGE and TITLE pseudo-opcodes to "pretty print" your listings. Jim Nangano of First Star Software has developed patches to *AMAC* to fix this. If enough people are interested, I'll reproduce them here (pending Jim's permission, of course).

Undocumented Features

There are several commands and command synonyms that are not documented in the manual. The most powerful is MSG. The format for the MSG command is:

```
MSG <string>
```

where ⟨string⟩ is a character string (if standard text, surrounded by single quotes). You can also include labels and constants, using commas, which are represented by 4 hex digits.

MSG prints a message to the screen during assembly, as well as writing a line to the listing over the code columns. Example: when developing programs, I frequently just include my display list in-line with my program. Since a display list cannot cross a page boundary, I put this in before the display list:

```
IF   LOW * > $100-
     display_list_length
MSG   'Space allocated:
       $',$100-LOW *
DS   $100-LOW *
ENDIF
```

If the assembler has to allocate space for the display list to not cross a page boundary, I get a message like:

```
'Space allocated: $003D'
```

on the screen to let me know there's a gap in the program. You could also use this command to let you know which parts of conditional assemblies were executed, and so on. It can be very useful to let you know what's going on when you compile.

There are two synonyms for existing commands. REPT is the same as ECHO. (I use REPT because it makes more sense to me than ECHO; small point, I agree.) INCLUDE can be shortened to INCL (which I use because it makes for neater listings — the seven letter command plays havoc with tab columns).

In addition, there are several commands that are recognized by the assembler but don't seem to have been implemented. ENTRY and EXT appear to be hooks for implementing a linking system that was never pursued. There are two data-defining commands that seem to produce a pattern of data, but one I can't figure out. They are DBE and DCE. You might try playing around with them to see what they produce.

Why Are You Using This Turkey, Then?

It may seem that I have a lot of gripes with *AMAC*. Well, they're not really gripes as much as "Gee, I wish those features worked better." Even with all of its problems, I still prefer the extra features *AMAC* has over other assemblers. And after using *MEDIT*, I won't use another line editor as long as I live. But even so, I think it behooves anyone who seriously attempts to use *AMAC* to be aware of these problems and of the possible fixes.

Next time, I'll get into how to use many of the more subtle features of *AMAC*, and introduce my theory behind macro construction. I'll give some pointers on how to construct them and some tricks I've learned.

Fodder for Thought

Some endorsements: I have spent the past two months getting to know, and love, a new language available for the Atari from Optimized Systems Software, the *Basic A+* people. It is called *Action!* and it is nothing short of amazing. The compiled code it produces rivals pure assembly language for speed, and doesn't produce near the overhead of a Basic or other language compiler. I used to use Basic for Q&D work. (Q&D stands for Quick and Dirty.) Things like data compacting, data entry and graphics file manipulations, used to get written in slow, methodical Basic. The *ABC Basic Compiler* speeded things up a bit, but it wasn't until *Action!* came along that I really felt like these mundane tasks weren't getting the best of me. For high-level structure and easily edited source code I get very fast, very compact programs. An unbeatable combination.

Endorsement #2: KoalaPad. For data entry, this is an unbeatable tool. It programs just like two paddles, and can be used for a variety of purposes. Besides entering graphics, you can use it to input data from a menu. (I use it to enter music data for my games.) Using the graphics drawing program that's supplied, you can create very sophisticated pictures for use in your own programs.

As a parting shot, I promised to pass along a useful tidbit of information each issue. I've received more than a few comments from people wanting to know how I managed to get the familiar key click in *Preppie!* without futzing up the display list. Many of you have no doubt seen Basic programs that used display-list interrupts where the whole screen shook when you typed at the keyboard. As a matter of fact, I am typing this article in using *AtariWriter* — and as I type I can see various markers in the text, which are highlighted by players, flash every time I press a key.

Why does this happen? Well, display-list interrupts usually perform a STA WSYNC ($D40A) which in effect shuts off the 6502 until the television beam reaches the right-hand side of the screen. This is done so that colors and other screen parameters can be changed while the beam is off the visible portion of the screen.

Enter the key-click routine. The click sound is performed by pushing/pulling the speaker inside the computer at a given rate. What is the rate? The OS writers thought that the time it takes the beam to draw across the screen, or roughly 114 machine cycles per line, would make a good interval. So, they did a STX WSYNC, *128 times!* What happens is that a WSYNC may already be in effect when a display-list interrupt kicks in, thus delaying the interrupt by one scan line.

If you have a whole screen of interrupts or your interrupt routines depend on a certain scan-line position, your display may lock up completely. The offensive OS code that does this is:

```
     LDX #$7F
X1   STX CONSOL
         ;$D01F
     STX WSYNC
         ;$D40A
     DEX
     BPL X1
     RTS
```

There are only two solutions. One is to rewrite a major portion of the key-input routine in the keyboard handler. Luckily, the click routine is only called at one spot in the routine, so you don't have to perform major surgery to correct it.

The second approach is the one I use. Ignore the K: handler completely, and monitor CH ($2FC). When you want to create a "click" sound, JSR through the following subroutine:

```
     LDX #$3F
X1   LDA VCOUNT;$D4
               0B
X2   CMPVCOUNT
     BEQX2
     STX CONSOL ;$D0
                 1F
     DEX
     BNEX1
     RTS
```

This pretty much does the same thing. VCOUNT is only updated every other scan line, so the sound is a little lower and more hollow, but it passes very nicely for a click. From Basic, you can put this routine in a string, as it is completely relocatable.

The Academic

by Lloyd Prentice

Many teachers don't like games. On the other hand, many do.

It just goes to show how elusive learning really is. Even the experts disagree on where, why and how it happens.

Take chess, for instance, is it educational? Or is Monopoly, poker or pitching pennies against the school house wall? What about *Pac-Man*, *Frogger*, *MasterType* or *Snooper Troops*? Can it be some games are educational and others not? Or, at least, that some games surpass others in educational merit? And if so, what makes the difference?

These questions are no longer academic. If you've browsed the racks of your local computer emporium lately, you've probably noticed signs of a bear market for shoot-'em-ups and a bull market for educational games. You've seen scores of educational games commanding shelf space. They have big marketing bucks behind them, all carefully designed, packaged and positioned for families with home computers. And soon you'll see more. Move over *Blast'em!* Make way for *Phasor Math.*

The touts from the market research companies are saying that when they look at computer use in the home today, learning is neck-and-neck with entertainment. Within four years, they say, 70 percent of all educational software will be sold for use in the home. When you couple these facts with the widely respected projection that 30 million American homes will have computers by the end of the decade, it's easy to see why the smart money is crowding in on the ground floor.

But this leaves the consumer with a problem. If teachers cannot agree on the educational merit of games, what is a parent or motivated youngster to do? Even if you accept, philosophically, the educational merit of games, how do you choose among the many attractive offerings?

Here are some helpful hints.

To assess the educational virtues of a game you must consider at least three levels — informational content, logical structure and the social context of play.

And, oh, yes, you must decide whether or not the game is fun to play.

At each level you must ask, specifically, what skills or abilities are necessary to win, to what extent these skills or abilities generalize to the larger spheres of life and whether or not these skills or abilities are enhanced through repeated play of the game.

Back to chess. From an informational point of view, chess provides a highly abstracted model of European power politics in the Middle Ages, but not enough facts to get you through a quiz in freshman Western civilization. The social interactions of chess are equally simple minded — dominate or be dominated.

The elegantly simple rules of chess, on the other hand, encourage intricate strategies that demand the utmost in concentration, visualization, search and planning to mount or defend. Nothing is hidden except the strategic intentions of the opponent. Prowess develops through experience and careful study, and the most skillful player always wins.

The logical structure of chess, in other words, is everything. It's difficult to assess how effectively skill at chess generalizes to other domains. But it is often used as a metaphor to help visualize strategic problems in international relations and business. The qualities that make a good chess player are certainly valuable in any endeavor requiring analytical ability and logic.

Contrast chess with pitching pennies against the school house wall. You throw. I throw. If both pennies come up either heads or tails, you win. If one comes up heads and the other tails, I win — virtually no informational content and little room for strategy. Assuming fair coins, pitching pennies is pure gambling. Lady Luck determines the winner. There's little room for educational experience. The most to learn is a smidgen of probability and how to win or lose gracefully — and maybe something about how to get along with the fellows out behind the backstop.

Let's look at a typical educational computer game from the point of view that we've outlined above — *Gulp!!*, an *EduFun!* game from the Milliken Publishing Company.

Gulp!! is a math game for children ages seven to 12, which provides drills in addition and multiplication at two levels of difficulty and speed.

When the first frame comes up you're underwater, looking at an anchor and a graceful stand of kelp — simple graphics, but effective. A little fish appears frame left with a big fish in hot pursuit. The goal is to answer 20 math problems as quickly as possible. If you make too many mistakes or take too long to respond, it's curtains for the little fish. The big fish eats him — a kind of one-dimensional *Pac-Man*. If you elude the big fish, you are rewarded with a bonus game. You get to cast a hook into shark-infested waters. Using the arrow keys to control the hook, you try to snag as many numbers as you can and bring them to the surface before the white shark eats them. You score 100 times the value of each number you hook.

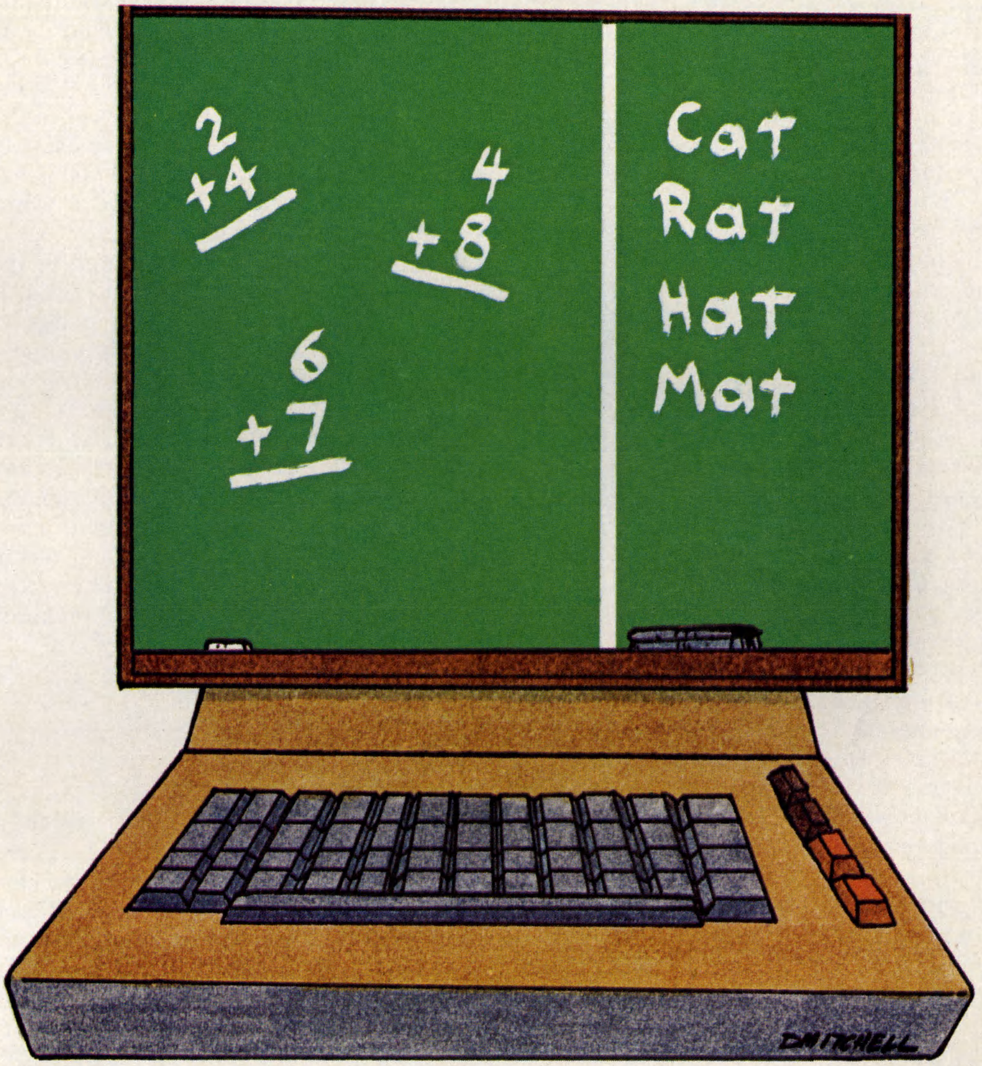
Clearly, the informational content of *Gulp!!* is limited to simple number facts. The game reinforces this, but does not actually teach them. The implicit biology lesson in *Gulp!!* is not significant enough to give a second thought. The logical structure of *Gulp!!* leaves little room for strategy. The only effective strategy is to solve the math problems as quickly as possible. Since *Gulp!!* is a single player game, social interactions do not enter into the picture.

In other words, *Gulp!!* is educationally thin. It is a pure drill without any attempt to make the logic or purpose of the arithmetic operations visible or manifest. Also, it's not clear why subtraction and division modes are not provided. Finally, the skill being reinforced is disconnected from the scenario of the game. For all we know, arithmetic skills are of little survival value to a little fish trying to escape the voracious jaws of a whopper.

But *Gulp!!* is not without redeeming value. Youngsters do have to learn the basic number facts presented in *Gulp!!* and rote practice is an important element in mastery.

Gulp!! has the virtue of motivating the youngster to put time into the traditionally boring practice task. It's a simple, unpretentious game that can be played many times without getting utterly tedious.

When you purchase *Gulp!!*, you also get *Arrow Graphics*, a pattern-making game that teaches problem solving and directionality. *Arrow Graphics* requires the player to decompose a complex pattern into its basic modular elements. The game is not as much fun as *Gulp!!*, but it makes effective use of the computer to reinforce a difficult idea. Well-packaged, *Gulp!!* and *Arrow Graphics* come in a sturdy 7-by-7-inch vinyl binder containing a single disk, a simple, but adequate instruction booklet and a reusable practice/score card. The cost is $39.95.



Gulp!! gives you a good idea of where most educational computer games are today — clever and cute, but one-dimensional. It's not from a lack of care or trying. Simply, the designers are still trying to understand the possibilities of the computer as a medium for instruction.

Strolling Forth

by Stephen Maguire and Evan Rosen

Let's quickly finish up discussion of the code for last issue's one-player "Dot-Maze" game and then move on to new topics.

On screen 16 last month was the word GET-STICK which stored the horizontal increment read from joy stick 0 in the variable DX, and the vertical increment into DY. (Remember, the increments may be -1, 0, or 1.) Built into GET-STICK, however, is a delay, determined by the variable STICK-DELAY, to slow the Wumpus down when traveling over open spaces in the maze. An open-space move is determined by the logic on line 4, which looks for a stick move in one and only one of the four directions up, down, left, or right, and line 5 which checks to see that the variable WUMPOS is over an inverse-video blank, value 128. The Wumpus is not slowed when running along the diagonal roads.

The word MOVE-OK? on screen 15 picks up the values in the variables DX and DY which are set by GET-STICK and checks to see if they are legal. The 198 and 199 in the definition are inverse video screen codes for 70 and 71. That is, 70 + 128 = 198 and 71 + 128 = 199. If the move is valid, then MOVE-OK? leaves a true flag, which is a 1. Otherwise MOVE-OK? leaves a false flag, a 0.

On screen 17 was PICK-ONE, a handy, random-picking routine which is aided by hardware-supplied random bytes from location 53770, which always provides a fresh random byte. Given a positive number n, PICK-ONE will randomly pick a number from 0 to n-1 and leave it on the stack. PICK-ONE is used in INITIALIZE, also on screen 17, to pick an initial position for the WUMPOS. INITIALIZE also sets the variables STICK-COUNT (the stick delay counter) and POINTS (the score counter) to 0 to clear any data left from a previous game.

The words SHOW-SCORES and FINISHED? on screen 18 are fairly self-explanatory. Remember, if you don't know what something does, like 125 EMIT, for example, you can always try it out.

This issue defines some words which simplify picking up keyboard input from within a running program.

Lastly, the word DOT-MAZE on last issue's screen 19 puts all the previous words together to run the game. Note the check on the value in the key input buffer, location 764, on line 10 of screen 19. This allows ending a game early by pressing any key. If the player wishes to start a new game, pressing the "Y" key will let him exit the present game and then go to a new one as the "Y" is picked up by the word FINISHED?. More on this key buffer in a moment.

This issue's "Snow" game is somewhat representative of FORTH-style coding in general. At the end of the listing you'll find the top word, SNOW, which calls some of the words below it, which in turn call words below them. The words are short, each composed of only about 30 or 40 other words at most, and all words have well-defined tasks which are indicated by the words' names. This is roughly how a program should look. But how do you get it to look this way?

If the programmer already has a precise idea of what a given program has to do, then it is possible to program "top down." That is, the programmer writes out the top word first. The top word will contain many undefined words, and these are defined next. These words will usually still contain undefined words, and the defining process continues down to the level until all words are defined in terms of the original set of words in the FORTH kernel. At this point the program is written and is ready for testing. This "top down" coding style is used with success in much commercial programming and in many languages, FORTH included.

In hobby hacking, however, "bottom up" or "inside out" coding also occurs. For instance, you may program random-number pickers or joystick-reading routines first, just because they happen to be more fun in themselves, or because you don't really know where you're going with the program yet. But eventually, when you have a solid plan in mind for your game (or whatever), make a final pass or two in "top down" style to clean things up. This will greatly simplify debugging, improve clarity and organization and will facilitate the making of changes later on.

Keyboard Interaction

For our main topic this issue we would like to define some words which simplify picking up keyboard input from within a running program. Restricting ourselves to single key inputs (rather than sequences or "string" inputs), we can still distinguish at least two different types of keyboard input: "Waiting for a key," and "Looking for a key."

Waiting for a Key, or, "What is your choice, Sire?"

This type of input may be implemented simply using the word KEY. KEY enters a loop and waits for any key to be pressed. When one is, KEY leaves the pressed key's ASCII code (or its Atari-modified ASCII code, called ATASCII) on the stack. Very often, a yes-no answer is required from the keyboard and the program prints a question and indicates it is waiting for a "Y" or "N" to be pressed: This happens so often, in fact,

Dr. Quatro

that it makes sense to define a word called Y/N, which can be tacked on after the question string in the word that asks the question.

Y/N may be implemented in many ways. On screens 70 and 71 in this article are two definitions which also illustrate differences between "hobby" or "quick" programming, and more "polished" or "friendly" code. Type in and load the code and type EXAMPLE, which uses the friendly and sophisticated version of Y/N, and note that it will accept only "Y," "y," "N," and "n" and won't let go until it sees one of these.

KEY may also be used to wait for a key that represents a choice from a menu displayed on the screen. That is, suppose we had four options at some point in a game. The code might look like that on screens 72-75. If you edit this into your system and type 72 LOAD (after loading the previous example) and then GAME, you'll get a sample menu.

Of course, this is a simple example, but the words RUN, FIGHT, SPELL and WAIT could have much more complex actions. They might look at some variables which would have information on "who" the enemy was and what "powers" it had, what kind of "power" the player had and how his "luck" was holding out, and so on.

So much for "wait for a key" input. But what if you are programming an action game where you don't want to stop everything while the player ponders a move? This requires getting key input of a different sort.

Looking for a Key

Suppose we want to pick up keys "on the fly" rather than waiting for them. We can't use KEY, which enters its own wait-loop. As it happens, in Atari 400's and 800's, location 764 holds a value, called a "key code," which corresponds to the last key pressed and is not absorbed by the operating system. These key codes don't seem to have any rhyme or reason to their numbering scheme, but still they can be used to identify key presses. Let's define a word to tell us a key's key code when we press the key.

```
: KEYCODE ( — )
  BEGIN 53279 C@ 7
  = 0 =
  UNTIL 764 C@ . 255
  764 C! ;
```

To find the key code of a key, type KEYCODE (Return), then press the key for which you want the keycode, and then press any one of the yellow console buttons, i.e., START, SELECT, or OPTION. (Location 53279 reads the console buttons, but in a slightly involved way.)

To illustrate one use of picking up keycodes on the fly, we'll make up a simple game called "Snow." The code is on screens 76 through 81, and may be loaded independently of the earlier code. For QS FORTH you must also *first* load its I/O package to get the word GR. into the system. For APX FORTH, first load the assembler and then the graphics package, to get GR. in. ValFORTH will load the code without extras. To run the game, type SNOW. The idea is to maneuver the bucket, a "U," under the falling asterisk snowflakes without letting any flakes hit the ground. The bucket is moved by pressing the "F" and "J" keys, which is really the point of the illustration. If you're using APX FORTH, then on successive runs of snow you'll need to say XGR SNOW instead of just SNOW.

Space does not permit a long discussion of the code, but here are some highlights. SNOW starts with an initialization routine and then enters a loop which moves the snowflakes and the bucket, and then delays for a while to slow the process down to human speed. The loop doesn't exit until the variable ?DONE becomes non-zero. This can only happen when a snowflake reaches the ground, which is determined in FALL?. Note the use of the random byte register, 53770, in FALL?, which is used to move a flake only one time in eight that FALL? is called.

And that's about it for now, except for a quick word from Dr. Quatro. Doctor?

Yes, yes, boys. The word is:

```
: BASE36 ( — )
  36 BASE ! ;
```

This little treasure lets us see short strings as numbers. For supposing, we can say now:

```
BASE36 QUA TRO
```

and we will get back "ok" because in base 36 "QUA" and "TRO" are numbers. You see it? And then we can also say:

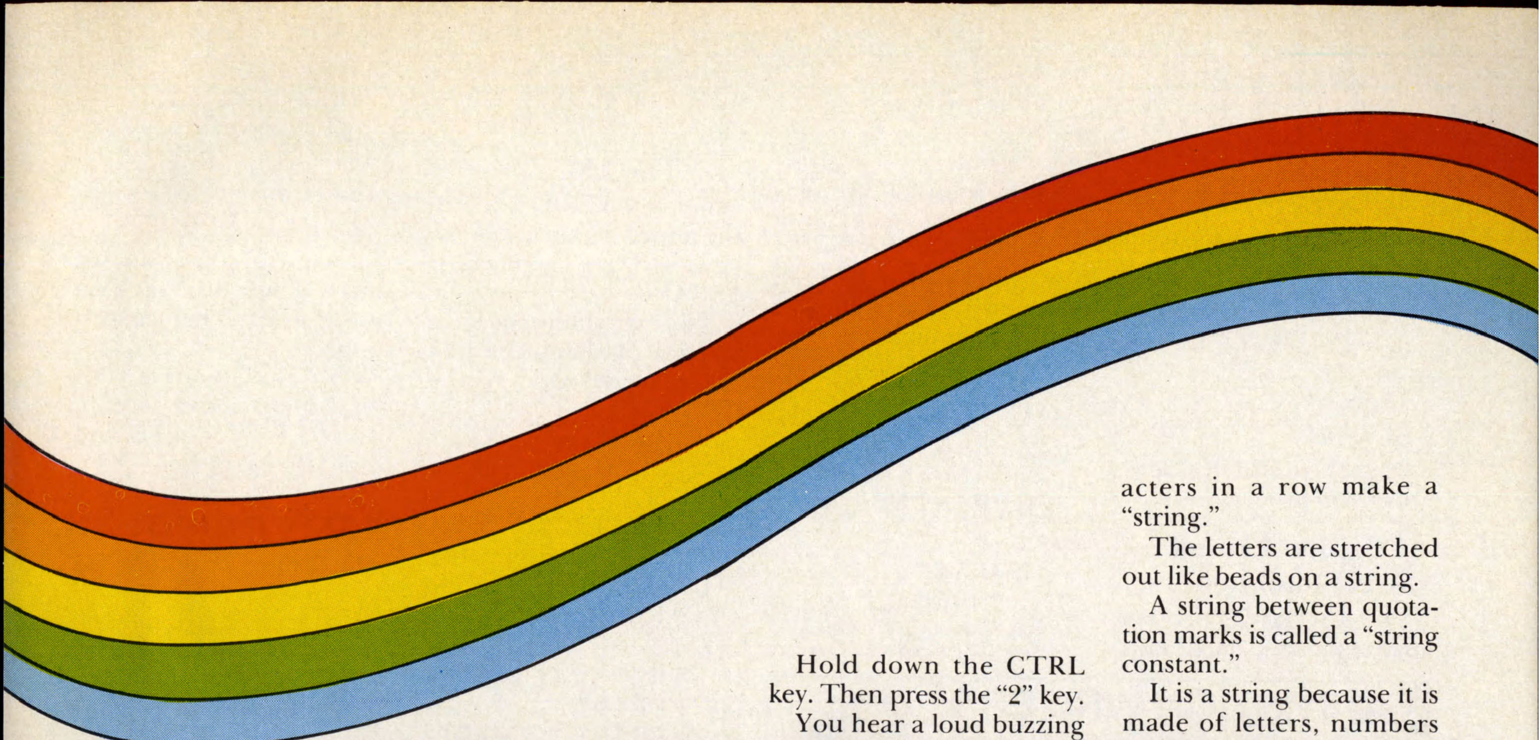
```
TWA 467 LAX
```

which means Trans World Airliners flight 467, Los Angeles International airport. Yes, it does!

Evan Rosen and Steve Maguire are the creators of Valforth by Valpar Int.

KIDS
and the
ATARI
ATARI
SUP

Kids and the Atari from Datamost introduces Atari Basic Programming to children aged 10 to 14. Arranged in 33 lessons, the book contains notes to the instructor or parents, examples, assignments and review questions. This is the second in a series.



Instructor Notes 2

Buzz, Inverse, String Constants

This lesson opens with the CTRL 2 key sequence which makes the buzzer sound. We wish to make plenty of "bells and whistles" available to the student to increase program richness.

The idea of a "string constant," used in Lesson 1, is explained. The numbers appearing in a string, for example the "19," cannot be used directly in arithmetic.

The INVERSE command puts a little pizazz on the screen.

Although the ATARI can print in lower case letters, we will not do so in this book. There are several reasons: we need lower case to indicate special commands like "buzz, inverse, normal, clear" in PRINT commands. The lower case letters are so small that they are not very clear anyway. And it just adds an unnecessary complication. If the instructor wishes to include lower case typing, do so by giving extra explanations, especially emphasizing that "clear" in a PRINT line does not mean type the word "clear," etc.

Questions:

1. How do you do each of these things: Make the ATARI "buzz?" Erase the screen? Empty the memory?
2. What is a "string?"
3. What special key do you press to "enter" a line?
4. What is a command? Give some examples.
5. How could you print "FIRE" in inverse letters and make the computer buzz?

Lesson 2

Buzz, Inverse, String Constants

Enter:

`NEW` (remember: RETURN key)

Then clear the screen (remember: SHIFT CLEAR keys).

You are ready to start this lesson.

Sounding the Buzzer

The ATARI has a buzzer. Use two keys to make it sound.

Hold down the CTRL key. Then press the "2" key.

You hear a loud buzzing sound.

CTRL stands for "control." This key helps control things on the computer. CTRL 2 makes the buzzer sound.

Printing an Empty Line

Run this:

```
10 REM LINES
20 PRINT "HERE IS
   A LINE"
30 PRINT
40 PRINT "ONE
   LINE WAS
   SKIPPED"
```

Line 30 just prints a blank line.

String Constants

Look at these PRINT statements:

```
10 PRINT "JOE"
10 PRINT
   "#D47*%"
10 PRINT "19"
10 PRINT "3,
   1416"
10 PRINT "I'M 14"
```

Letters, numbers and punctuation marks are called "characters."

Even a blank space is a character.

Look at this:

```
10 PRINT " "
```

(Later we will have graphics characters too, and some special characters like "buzz" and "clear.") Characters in a row make a "string."

The letters are stretched out like beads on a string.

A string between quotation marks is called a "string constant."

It is a string because it is made of letters, numbers and punctuation marks in a row.

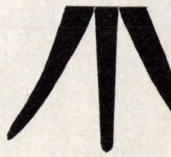
It is a constant because it stays the same.

It doesn't change as the program runs.

Inside Out Printing

There is a special key on the ATARI computer.

It looks like this:



It is called "the ATARI key."

Press it. Type.

Now all the letters you type are in the "inverse" mode.

Press the ATARI key again. Type.

You are back to normal (non-inverse) letters.

Use inverse to make the stuff printed on the screen look more interesting.

Inverse and Normal In Print Commands

We have a special way of telling you to press the ATARI key.

We will say "inverse" or "normal." It looks like this:

```
10 REM BLACK AND
   WHITE
20 PRINT
   "INVERSE
```

```
WHITE NORMAL
BLACK"
```

This means:

Type:

```
20 PRINT"
```

Press the ATARI key

Type:

```
WHITE
```

Press the ATARI key again

Type:

```
BLACK"
```

Press the RETURN key.

Run the program.

Capital Letters And Small Letters

The ATARI can print in small letters (the ones called "lower case").

But in this book, we will not use any lower case on the computer.

IMPORTANT! Whenever you see lower case writing inside the quotation marks of a PRINT command, it will have a special meaning.

```
20 PRINT INVERSE
```

is not

```
20 PRINT
   "INVERSE"
20 PRINT NORMAL
```

is not

```
20 PRINT
   "NORMAL"
```

We saw one special meaning above with the ATARI key. Here is another.

ATTENTION WRITERS!

Hi-Res wants your magazine or book length articles. If you've developed educational or graphic computer programs, double space your manuscript, include a stamped, self-addressed envelope and mail to:

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The ESC Key

Find the ESC key. It is in the upper left corner of the keyboard. ESC is short for ESCAPE.

This key helps us give special instructions like "clear" and "buzz" to the computer.

Whenever you see "clear" in a PRINT command, do this:

Press the ESC key once.

Then hold down the SHIFT key and press the CLEAR key. Got it?

Enter:

```
10 REM SPECIAL
   PRINT
20 PRINT "CLEAR"
30 PRINT "CLEAN
   SLATE"
```

Of course you do not see "clear" in line 20. You see a funny bent arrow instead.

Whenever you see "buzz" in a PRINT command, do this:

Press the ESC key once.

Then hold down the CTRL key and press the 2 key.

Add this:

```
40 PRINT "BUZZ"
```

Of course, you do not see "buzz" in line 40. You see a funny inverse bent arrow instead.

Run the program. It should clear the screen, print CLEAN SLATE, and sound the buzzer.

Assignment 2:

1. Write a program that prints your first, middle and last names. Make the first and middle names in normal letters, and the last name in inverse letters.
2. Now make the program clear the screen before writing anything.
3. Now make the buzzer sound before printing each name.

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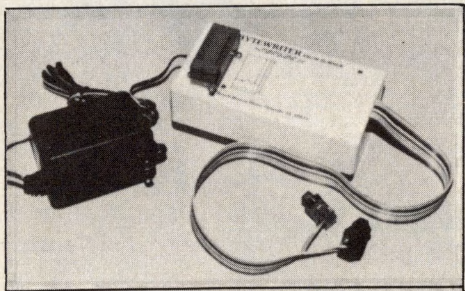

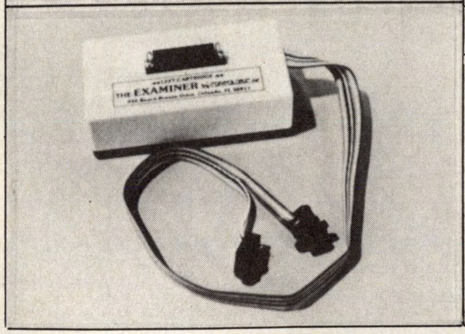

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Perspectives

Oh, Those Dreaded Computers

Even though computers are increasingly important in most aspects of life, nearly a third of all people are afraid of using them, a university researcher says.

About 30 percent of adults suffer from cyberphobia, or fear of computers, said Abraham Kandel, Florida State University computer science department chairman.

Courses to combat cyberphobia are necessary, he said, because computer experts have so far failed to educate the public about some of the advantages of the technology.

"In the early part of the century, there was a fear of telephoning," Kandel said. "Later, there was a fear of flying.

"Now, (we have a) fear of computing."

-JBII

Better Learning

A recent study by Program Design Inc. indicates preschool children can increase their learning skills at a much earlier age than previously thought — through the use of computers.

Twenty 3-and 4-year-olds, all from the same socioeconomic background in Connecticut, were chosen for the study. The group was divided into two sections, half studying with the aid of educational software programs produced by PDI, and the other half serving as a control.

"The children working with computers made a substantial gain of 47.4 percent, while the control group gained only 13.5 percent," said John Victor, president of PDI.

With the assistance of computers, the study found the children increased not only their reading skills, but also advanced their confidence level and ability to make decisions, Victor said.

"Computers are especially effective with children at the early stage of development," he added. "For one thing, they really enjoy working with them. It seems more play than work."

-JBII

Fun And Games

Fun and learning need not be opposites, according to Atari Inc., which recently opened a unique learning and entertainment center in St. Louis.

Called Atari Adventure, the center offers something for just about everyone. It features a hands-on Computer Learning Center with a full-time instructor in addition to a high-tech video game room. The center also includes a special display area where visitors can "touch tomorrow" through the latest in video game technology.

The Computer Learning Center is an eight-station classroom setting with an extensive software library, including word processing, Visicalc, programming languages and, of course, games.

-JBII

Holy Video

Amen.

Video game cartridges based on Bible stories have joined the ranks of computer games, with several already introduced during the past nine months.

While the Bible lessons show no indication of threatening the likes of Pac Man and the rest of the bunch, the games' producers hope the Bible versions will catch on with churches.

-JBII

Warner Loves First Star

Warner Software Inc., the recently-formed subsidiary of Warner Publishing, has acquired a substantial interest in First Star Software, Inc., designers and publishers of computer software.

Under terms of the agreement, First Star will continue to operate independently — but supported by the additional strengths, business experience, and publishing, marketing and distribution resources of Warner.

-JBII

Tune In To This

Atari Inc. and Activision Inc. have formed a joint venture to broadcast video games to households.

The companies will introduce the service commercially during the second half of this year.

An unspecified type of broadcast technology will be used to transmit the games to a home receiver that plugs into a video game player. Initially, however, the service will play only on the Atari 2600 player or compatible machines.

The venture should provide game manufacturers and retailers with a gauge as to what games are popular.

-JBII

Back Space

For All Readers

I have just finished reading the first issue of Hi-Res Magazine and am elated that someone has finally published a document that dummies like me can read and understand. All the articles started with the basics and fully explained any technical jargon. This is the kind of stuff that the majority of us out here are hungry for. I, for one, think your magazine will do very, very well if you keep on your present course.

Of course you're not perfect yet. May I suggest the following:
1) The more good utility and game programs you can supply, the better. 2) Differentiate between the zeros and the "Os in program listings. 3) Publish a list of typing conventions for CNTL and ESC symbols etc. 4) Proof-read and run your programs. I tried to type in the program but had to give up on it. 5) Something you seldom see in computer oriented magazines are construction projects. Most home computer owners are probably not experimenters but most experimenters probably own a home computer. Many of us would like guidance on building interfaces, printer buffers, power supplies etc. Keep up the good work. I'll be looking forward to the second issue.

— CHESTER HARBIN,
Valparaiso, FL

* * *

I am an avid ATARI fan and ATARI 800 computer owner. I was thumbing through the magazine shelve for the latest issue of COMPUTE! or A.N.A.L.O.G., when the Premiere Issue of Hi-Res caught my eye. I decided to give it a try. The scrolling color machine language routine itself was worth the $3.00 cost of the magazine! The history of Atari Inc. was veryinteresting and I would love to know how the Atari 400-generated image of Nolan Bushnell was accomplished. Also, thanks for the article on Bill Hogue and Miner 2049, which I plan to add to my software library in the near future.

— WAYNE GAUTNEY,
Mobile, ALA

CORRECTIONS

NUMBER MAZE, Issue 2, page 27

```
8  MAZE$(C1)=CHR$(0):MAZE$(278)=CHR$
(0):MAZE$(C2)=MAZE$

18  MA$(C1)=CHR$(0):MA$(278)=CHR$(0):MA
$(C2)=MA$

3520 ? #6;"    ";:IF P1<C10 THEN ? #6;"    ";

3522 ? #6;P1;:NEXT J:? #6;"      ";:NEXT I
```

SOME ASSEMBLY REQUIRED, Issue 2, page 61

The fourth paragraph in column 1 should read: The number 130, for example is represented by the binary combination 10000010 and the number 80 by the binary combination 01010000.

* * *

Your magazine is great. I'm an Atari Club Member. Hi-Res tells me about Atari's computers. I love your magazine. I might subscribe.

— JOHN F. DIMITNOFF,
Orange, CA

* * *

Explanations Needed

My interest lies in learning advanced graphics, techniques in BASIC, and in learning assembly language (at which I am a beginner). In your premiere issue, you showed a short assembly program (p.71). Please explain everything you're doing, line by line — not just with the REMARKS (comments). I like the other articles, too; and the magazine looks great!

— M. TORRONE,
Kent, WA

* * *

Impressive amount of big name contributors. Needs authors among "common folks." Very varied and could use more technical materials and programs.

— ANDREW KATZ,
Little Ferry, NJ

* * *

Shape Up

I hope program listing is not an example of future Hi-Res listings, as there are approximately 20 characters missing!! If your listings cannot be more accurate, I'm sorry I subscribed to this magazine!

— JASON SCHENZEL,
Schofield, WI

* * *

A Bit Advanced

I liked all of the columns and what each was to cover. Need a column for beginning computer users.

— WESLEY TURNER,
Tempe, AZ

* * *

A Bit Elementary

The magazine is pretty good. Personally I find the articles too elementary, but then I am a software engineer professionally.

— ROBERT F. SADOWNICZAK,
Daytona Beach, FL

* * *

However...

I find that there is both general and advanced articles which is good because it interests all groups of users.

— SEAN BINKLEY,
Ontario, Canada

* * *

A-Ok

Just right! I am especially excited about articles on Assembler by R. Wetmore and Robert Peck. My subscription order is enclosed.

— RONNA CEKINOVICH,
Rockford, IL

* * *

The Perspectives column is great!!! I like the Reviews a

lot also. I would like to see more ads, but I'm sure that will happen eventually. How about a thicker magazine? I'm still ready for more. Nice job!
— ROY WOOD,
Terre Hauk, IN

★

Want More...

Like to have a listing of what is available on cassette, disc and cartridge for Atari (800) by Atari or any other popular company, average price, and rate them by graphics, colors, difficulty and show graphics.
— ROB KUTCH,
Robbinsville, NJ

★

More programs, more information on Atari compatible hardware/software. Here's my check, you done good!
— D.C. DOHERTY,
Olympia, WA

★

Please more programs we can enter. I'm a novice and the articles on Error Messages & Graphics Modes turned on a light for me. More! More!
— CAROL M. CRENSHAW,
Cuyattoga Falls, Ohio

★

Not Up-To-Date

Jeez, guys! are you living in the 19th century? Saying that Dig Pub is about to be released which I bought five months ago isn't what I call up-to-date facts. And, about your facts — so, Atari made the coin-up defender. Boy, could have sworn that Williams made that one. Guess they didn't, even though their name is written all over the machine! Honestly, I'm not a critic, but I'm only 11 and I know more facts than you do! Dig Peeper, Fellas. I'm not angry, just discouraged that you people don't have your facts straight. I'm sorry, but until those facts are fixed, your magazine is just a big disappointment to me.
— CHRISTOPHER MOLANPHY,
Brooklyn, NY

★

Your "Reviews" are great! How about some articles on peripherals?
— ANGEL TRUE,
Longwood, FL

★

If the quality continues as in this issue or gets better, you can only have success!
— KENNETH SUZUKI,
Montgrey Park, CA

Of References

I loved your magazine! It was informative and enjoyable. I used it for my school project on "Video games"
— LAURIE LOCASHIO,
Winchester, MA

★

Sorry, but...

I enjoyed your first issue. It was very informing. But, I have no intention of buying one of Atari's computers. You see, my school was promised by Atari to receive free Atari computers. But, that was quite a while ago. My school is: Isaac Bildersee J.H.S. 68, Brooklyn, NY.

I am going to get a Commodore 64 computer. It is more efficient.
— HELEN COULTON,
Brooklyn, NY

Letters to the editor should be addressed: Back Space, Hi-Res Magazine, 933 Lee Road, Suite 325, Orlando, FL 32810. All letters should include the writer's full name, address and home telephone. Letters may be edited for purposes of clarity or space.

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Previews

Right Stuff with Solo Flight

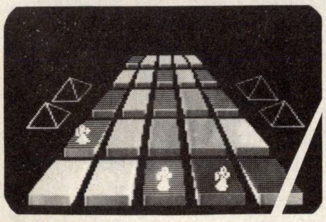
Grab your helmet and flying gear, and get ready to show your "Right Stuff" with *Solo Flight*, an exciting and realistic three-dimensional flying simulation for the Commodore 64 and Atari computers from MicroProse software.

Solo Flight, a flight simulator for home computers, combines the excitement of flying by accurate simulation with the thrill of accomplishment in overcoming the dangers of rough terrain, bad weather, and mechanical and instrument failures. Suggested retail price is $34.95.

MicroProse Software,
10616 Beaver Dam Rd.,
Hunt Valley, MD 21030.

3-D Action

Silicon Warrior is one of two new games for the Atari and Commodore 64 from EPYX. In this three-dimensional game, characters disappear and reappear, making this a very special action/strategy game.



Silicon Warriors

In *Pitstop*, the player controls his racing car with steering and speed controls. In order to win the race, the player must decide if a pitstop is necessary and when to make it.

EPYX, Inc., 1043 Kiel Court, Sunnyvale, CA 94089.

1 + 1

Success with Math, from CBS Software, is a series of math review programs designed to help the student learn and practice math skills at his own pace and allow him to choose the number and difficulty level of the problems he wishes to solve.

The classroom-tested programs take the student, step-by-step, through arithmetic and algebra concepts. They are encouraging, never judgmental, simple to use and require little or no use of printed material. Suggested retail prices are $24.95 for disk and $19.95 for cassette.

For more information contact Schwartz Public Relations Associates, Inc., 183 Madison Ave., New York, NY 10016.

Secret's Worth $10,000

Hop along with *Pogo Joe* as he bounces across fields of cylinders to escape his foes. Travel with Pogo to the 10th screen to find the secret word which could win you $10,000 in cash!

In *Asylum* you are confronted with wacky inmates and mysterious obstacles as you struggle to escape the grueling maze. Can you keep your sanity while seeking the answer hidden in the mirror of *Asylum*?

Pogo Joe is available in 48-64K on the Atari for $24.95 and *Asylum* in 48K for $29.95.

For more information contact ScreenPlay, P.O. Box 3558, Chapel Hill, N.C. 27514 or call 1-800-334-5470.

KONAMI'S
POOYAN
Datasoft

Pooyan

Pooyan Adapted for Commodore

Pooyan, the quick-reflex, fast-thinking action game where hungry wolves hunt defenseless piglets, has been adapted for the Commodore 64 home computer by Datasoft, Inc.

Featured with high-resolution color graphics and multiple screen scenarios, *Pooyan* can be played by one or two players. Available on disk and cassette for the Commodore and Atari, *Pooyan's* suggested retail price is $29.95.

Datasoft, Inc., 9421 Winnetka Ave., Chatsworth, CA 91311.

New Levels of Adventure in Vanguard

Attention space pilots: Looking for new frontiers of adventure? Join the expedition through the tunnels of planet Aterria, find the fabulous city of Mystery and destroy the great Gond in *Vanguard*, the recently introduced video game from Atari.

Vanguard is available for the 2600 VCS console at a suggested retail price of $30.45 and for the 5200 Supersystem, $40.95.

For more information, contact Atari, Inc., 1265 Borregas Ave., P.O. Box 427, Sunnyvale, CA 94086.

Prophecy is with You

The Prophecy is on your side in *Krull*, recently introduced by Atari.

The land of *Krull* has been plunged into darkness by the Beast and his army of marauding Slayers. Hope lies in The Prophecy, which says Prince Colwyn shall rule the planet. But the marriage ceremony uniting Colwyn with Princess Lyssa is tragically interrupted by the Slayers and it is up to you to free Lyssa from the Black Forest.

Strength and courage are needed to succeed in this perilous journey, but remember: The Prophecy is on your side.

Atari, Inc., 1265 Borregas Ave., P.O. Box 427, Sunnyvale, CA 94086.

Journey into Space

Space Shuttle, designed by Steve Kitchen, transforms the Atari 2600 into an orbital voyager. From Florida liftoff to California touchdown, the player-pilot experiences firsthand an actual NASA Shuttle flight.

The mission is clear and vital. A satellite, 210 miles above Earth, is spinning out of orbit with intentionally programmed gyroscope problems. At the helm of Space Shuttle Discovery, the player must launch, rendezvous and dock with the errant satellite, then return safely to Earth. Suggested retail price is $34.95.

Activision, Inc., 2350 Bayshore Frontage Rd., Mountain View, CA 94043.

It's Magic

Sorcerer's Apprentice, recently introduced by Atari, captures the magic and fantasy of the Walt Disney movie, "Fantasia."

Featured with colorful graphics and music from the famed film, this skill and action video game finds Mickey Mouse up to his ears in magical mischief. Designed for players 5 years and older, *Sorcerer's Apprentice* retails for a suggested price of $30.95.

Atari Inc., 1265 Borregas Ave., P.O. Box 427, Sunnyvale, CA 94086.

Drol's Toll

Complete with sound effects and an original theme song, the players of *Drol* take on the task of pursuing a little girl and her brother who have wandered away from their mother.

If you're successful in reuniting the children with their mother, you will be rewarded with an endearing cartoon. *Drol* is available on disk for both Atari and Commodore 64. Both versions have a suggested list price of $34.95.

Broderbund Software, 17 Paul Dr., San Rafael, CA 94903.

Answers to Crossword

	P										F	L	E	A	S				
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	X		A			S							M	E	A	T			G
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	A		K			A			U			I			M	A	R	I	O
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			F						K			R			R		S		G
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NEXT ISSUE

A Guide to Atari BASIC:

Beginning programmers, here's your chance to learn everything you always wanted to know about BASIC commands — but were afraid to ask.

True Confessions:

How have computers affected your life? Sandra Markle talks candidly about the way computers have changed and how they have altered this computer Mama's style.

Electronic Arts:

Come to San Mateo and take a peek behind the scenes of software development for the Atari. Discover some of the people at Electronic Arts and find out their latest creations.

Jack Truehart:

Will Jack Truehart escape the dreadful POKEY? Will McGinty be recharged? Will robot-servant Hubie save the sweet and sour shrimp? Watch for the continuing saga of our wise-cracking CIO operative.

Stumbling Blocks:

Students — put away those pens and pencils and learn the basic terms and general characterics of pictorial drawing with your computer.

Strategy:

Tired of playing the same old chess and checkers? *Lines of Action* by Claude Soucie may be the game for you where each move may change the configuration of the board — and your strategy.

Action! Man:

Find out about Clinton Parker, the genius behind Action! — the most powerful and efficient language system available for the Atari computer.

Plus...

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"Zounds Sounds", Feature, Premiere Issue, 1983, p.32.

Reader Profile:

1. **What Atari/Commodore system do you own?** ____________________
2. **How many cartridges/disks do you own for each specific system?** ____________________
3. **How many of those are published by Atari/Commodore?** ____________________
4. **Do you own a disk drive?** ____________________
5. **Do you own a cassette?** ____________________
6. **What are your favorite games?** ____________________
7. **My system is used primarily for:**
   - ☐ Game playing
   - ☐ Home finance
   - ☐ Research
   - ☐ Business Management
   - ☐ Word processing
8. **Do you use your system for programming?** ____________________
9. **What is your age?**
   - ☐ Under 16
   - ☐ 16-21
   - ☐ 22-28
   - ☐ 29-35
   - ☐ 36-45
10. **What is your occupation?** ____________________
11. **What is your approximate annual family income?** ____________________
    - ☐ Under $10,000
    - ☐ $10,000 to $20,000
    - ☐ $21,000 to $26,000
    - ☐ $27,000 to $35,000
    - ☐ More than $35,000
12. **How much do you spend on software in a year?** ____________________
13. **Did you purchase your Atari/Commodore new or receive it as a gift?** ____________________
14. **If you're a student, do you have access to an Atari or Commodore in school?** ____________________

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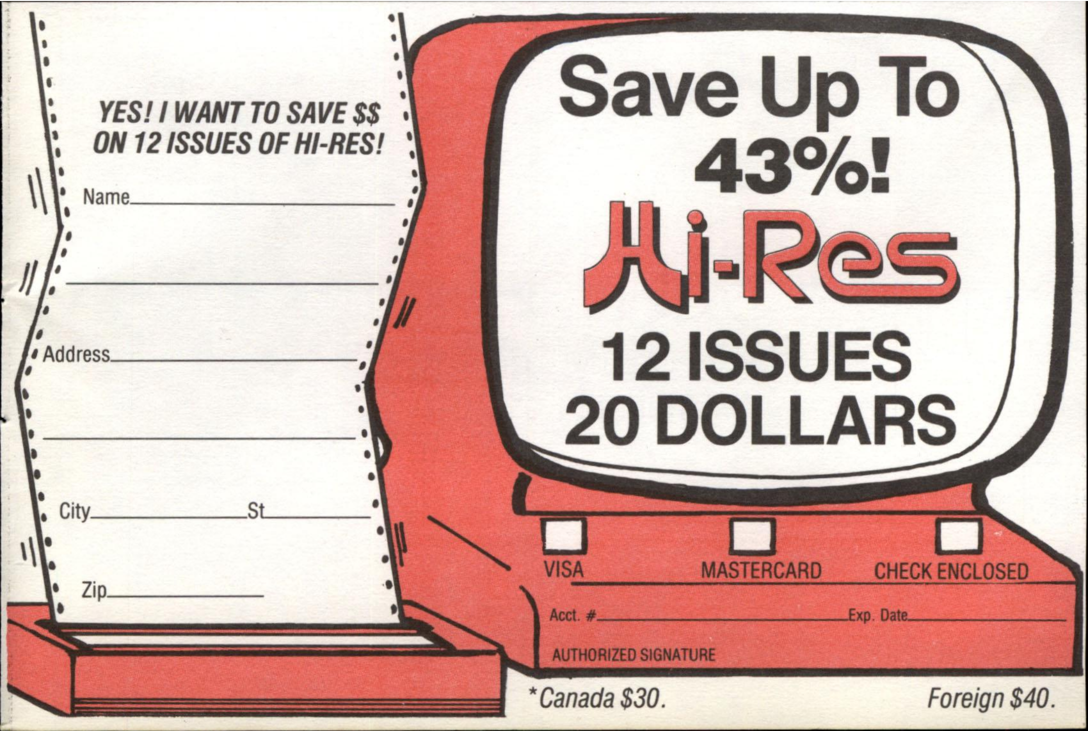

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We're anxious to hear your opinions about our Atari/Commodore magazine. Tell us if we're too technical or too general. Sound off!

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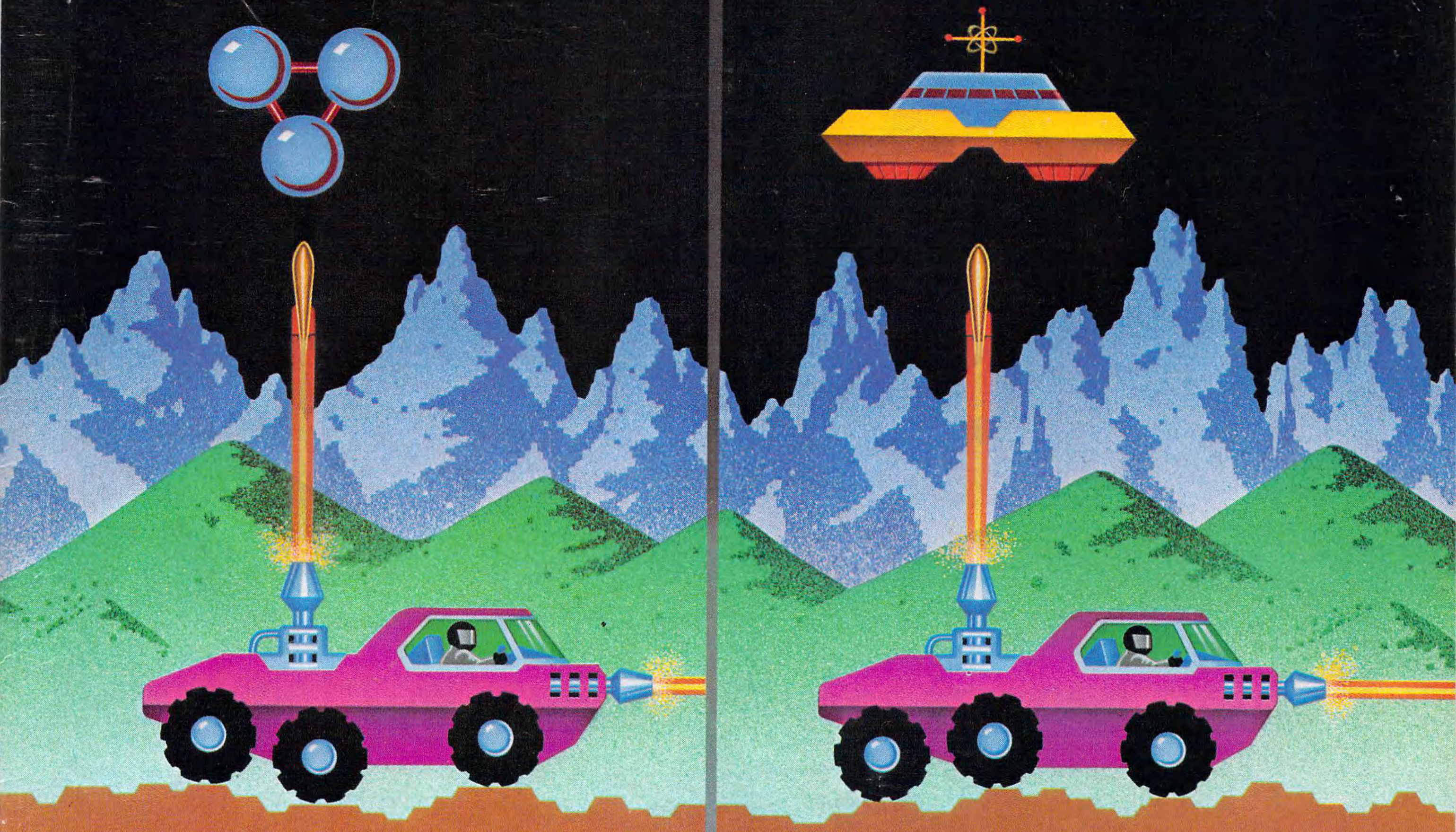

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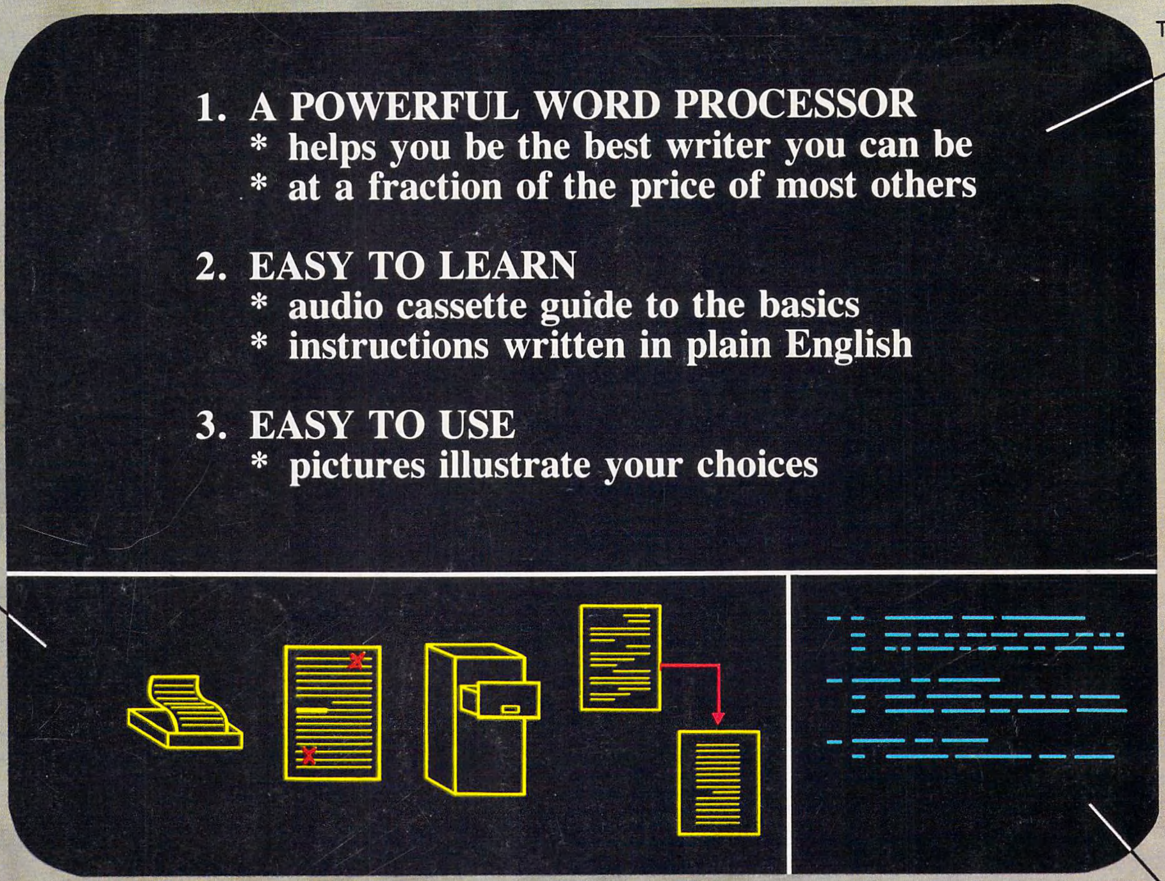

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